INSTALLATION RESTORATION PROGRAM

FT-002 FREE-PRODUCT REMOVAL ACTION ENGINEERING EVALUATION/COST ANALYSIS

PLATTSBURGH AIR FORCE BASE
PLATTSBURGH, NEW YORK

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FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

TABLE OF CONTENTS

FT-002 ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

TABLE OF CONTENTS
(continued)

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

LIST OF FIGURES

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

LIST OF TABLES

EXECUTIVE SUMMARY

The purpose of this Engineering Evaluation/Cost Analysis (EE/CA) is to identify removal action objectives, to identify and evaluate removal action alternatives that will achieve those objectives, and to recommend, based on the evaluation, the removal action alternative that best meets the evaluation criteria. The removal action will address only free product in soil at the fire training area (FT-002) which is a major source of groundwater contamination. The source of the free product is fuel and solvents that seeped into the soils during fire training activities, which were conducted at the site from the 1950s to 1988. Contaminated groundwater and residual product in the soil will be addressed by future remedial actions at the site. Information collected during the free product removal action will be used to supplement data gathered during the Remedial Investigation (RI), and to scope the Risk Assessment and Feasibility Study for contaminated groundwater and residual product at FT-002.

On January 18, 1990, the U.S. Environmental Protection Agency (USEPA) Region II and New York State Department of Environmental Conservation (NYSDEC) Project Managers for Plattsburgh Air Force Base (AFB) verbally concurred that a removal action for free product in the soil at the fire training area was warranted to substantially reduce a continuing source of groundwater contamination. On July 23, 1990, Plattsburgh AFB submitted to USEPA a Removal Assessment letter, formally identifying the "non-time-critical" removal action for FT-002 free product. Although the free product is a major source of groundwater contamination, direct contact with the free product is not a concern and drinking water supplies are not currently being affected. Therefore, USEPA requested that Plattsburgh AFB prepare an EE/CA to document the analysis of potential removal alternatives in support of the "non-time-critical" removal action. This document was prepared in accordance with USEPA's EE/CA Guidance Outline (USEPA 1988a) and is intended to comply with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and National Environmental Policy Act requirements.

Previous investigations conducted at FT-002 include a Site Inspection (SI) and RI. Data from the SI indicate the presence of free product in the soil above the water table, adjacent to the southeast (downgradient) side of fire training pit #1. The free product consists of primarily of jet fuel with some chlorinated solvents. The areal distribution of the free product was defined during the RI.

Because there are currently no exposure routes or receptors associated with the free product, FT-002 removal action objectives were not developed based on current ecological and/or public health considerations. The following removal actions objectives were developed based on future groundwater use considerations:

- remove free product to mitigate off-site migration of contaminated groundwater; and
- remove free product to limit the potential risks if groundwater is used as a potable source in the future.

Based on the removal action objectives and results of a free-product recovery pilot test, the following two removal action alternatives have been identified:

1. Free-product skimming with aquifer drawdown, groundwater treatment, and discharge to surface water.

2. Free-product skimming with aquifer drawdown, groundwater treatment, and reinjection to the aquifer.

The components of the two alternatives are the same with the exception of treated groundwater discharge. Because free-product removal would involve aquifer drawdown, contaminated groundwater would be extracted and would require treatment prior to discharge. The treated groundwater from Alternative 1 would be discharged to a stream located approximately 2,500 feet south of FT-002. The treated groundwater from Alternative 2 would be reinjected to the aquifer on-site, upgradient from the existing free-product area and an associated plume of contaminated groundwater. Because of the different discharge locations, separate discharge limits for contaminants apply to each alternative. Treated groundwater discharged to the stream would comply with limits established by NYSDEC based on treatment technology and water quality considerations. Water reinjected to the aquifer would meet standards established by NYSDEC. The surface water discharge standards presented in this EE/CA are currently being reevaluated by NYSDEC. Surface water discharge standards for some inorganic compounds and phenolics may change based on NYSDEC's review.

The removal action is expected to operate for a minimum of 12 months. For the purpose of preparing cost estimates, it was assumed that the removal action would operate for periods of 5 and 15 years. Based on current surface water discharge standards, the net present worth of Alternative 1 is $1,266,000 for 5 years of operation and $2,063,000 for 15 years of operation. Based on the current groundwater reinjection standards, the net present worth of Alternative 2 is $1,216,000 for 5 years of operation and $1,944,000 for 15 years of operation.

The evaluation of alternatives was conducted using the effectiveness, implementability, and cost factors presented in USEPA's EE/CA guidance outline. Based on the evaluation, Alternatives 1 and 2 would be similarly effective and implementable. Because of the similarities in the evaluation of alternatives, Alternative 1 or Alternative 2 could be selected as the preferred alternative for free product removal at FT-002. Plattsburgh AFB has selected Alternative 1 as the preferred alternative (Alternative 1: Free Product Skimming with Aquifer Drawdown; Groundwater Treatment; and Discharge to Surface Water). If the surface water discharge standards are modified by NYSDEC, revised cost estimates for Alternative 1 could be further reduced.

1.0 INTRODUCTION

The Department of Defense (DOD) initiated an investigation and remediation activities for evaluating problems related to suspected past releases of toxic and hazardous materials at DOD facilities. This program, the Installation Restoration Program (IRP), was developed as a component of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the 1986 Superfund Amendments and Reauthorization Act (SARA). The Strategic Air Command (SAC) entered into an interagency agreement (IAG No. 1758-1758-A1) with the Department of Energy (DOE), under which DOE will provide technical assistance for the implementation of SAC IRPs and related activities. SAC requested DOE support in assessing the extent of contamination at sites on Plattsburgh Air Force Base (AFB) in Plattsburgh, New York. Martin Marietta Energy Systems, Inc. (MMES) was assigned the responsibility for managing this effort under the interagency agreement through the Hazardous Waste Remedial Actions Program (HAZWRAP). The IRP at Plattsburgh AFB was assigned to E.C. Jordan Co., an MMES subcontractor, in 1986. The IRP at Plattsburgh AFB has included a Site Inspection (SI) and an ongoing Remedial Investigation (RI).

One of the sites being investigated is the fire training area (FT-002) located on the west side of the base (Figure 1-1). The site was used for thirty years for training fire fighters. Data from the SI indicated a layer of nonaqueous phase liquid (i.e., free product) in the soil just above the groundwater at FT-002 (E.C. Jordan Co., 1989). This layer consists of fuel components and chlorinated solvents. Constituents of the free product are also dissolved in the groundwater, forming a plume extending from FT-002 toward the center of the base. The areal distribution of the free product was defined during the RI.

Because the free product is acting as a continuing source of the contamination to the groundwater, a "non-time-critical" removal action was authorized by the U.S. Environmental Protection Agency (USEPA) Region II for the free product area at FT-002. In support of the removal action, this Engineering Evaluation/Cost Analysis (EE/CA) has been prepared in accordance with the following guidance and regulation: the Plattsburgh AFB Project Work Plan; CERCLA, as amended by SARA (references made to CERCLA during this report should be interpreted "CERCLA, as amended by SARA"); the National Oil and Hazardous Substances Pollution Contingency Plan (NCP); the EE/CA Guidance Outline ; and the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (RI/FS guidance) (E.C. Jordan Co., 1990; USEPA, 1990; USEPA, 1988a; USEPA, 1988b).

This introductory section is organized as follow: Subsection 1.1 presents the purpose and scope of the FT-002 EE/CA; Subsection 1.2 presents the site characterization; and Subsection 1.3 provides the removal action justification.

1.1 PURPOSE AND SCOPE OF THE EE/CA

The purpose of the FT-002 EE/CA is to identify removal action objectives and to evaluate and select a removal action alternative that will achieve those objectives. The FT-002 EE/CA will also serve as the basis for the Action Memorandum, the primary decision document substantiating the need for a removal response, and for design and construction of the selected removal action.

The removal action alternative selection process used in this EE/CA consists of four basic steps: identification of removal action objectives; identification of removal action alternatives; evaluation and comparison of removal action alternatives; and recommendation of a removal action

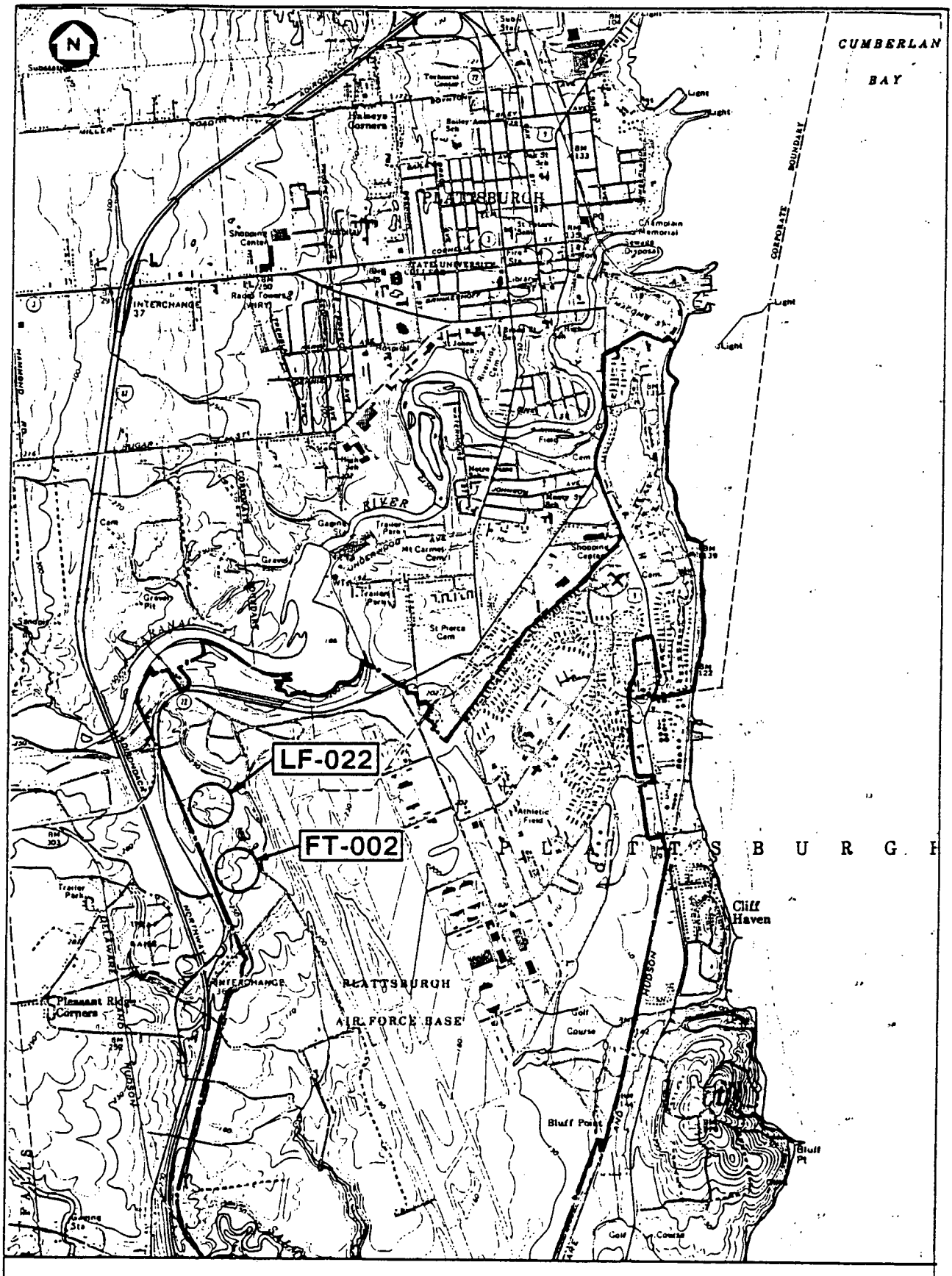


FIGURE 1-1
FIRE TRAINING AREA (FT-002) LOCATION
FT-002 FREE-PRODUCT REMOVAL
ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

alternative. Removal action objectives, which are the goals of the removal, were developed based on public health and ecological concerns. The remedial action objectives for the free-product at FT-002 are identified in Section 2.0. Once the removal action objectives have been defined, removal action alternatives that can meet those objectives are identified. Alternatives identified for the FT-002 removal action are described in Section 3.0. Following alternatives identification, alternatives are evaluated and compared with respect to effectiveness, implementability, and cost factors. The evaluation and comparison of alternatives are presented in Section 4.0.

1.2 SITE CHARACTERIZATION

This section presents the site characterization for FT-002. The site description and history are contained in Subsection 1.2.1. Summaries of the investigations that have been conducted previously at the site are contained in Subsection 1.2.2.

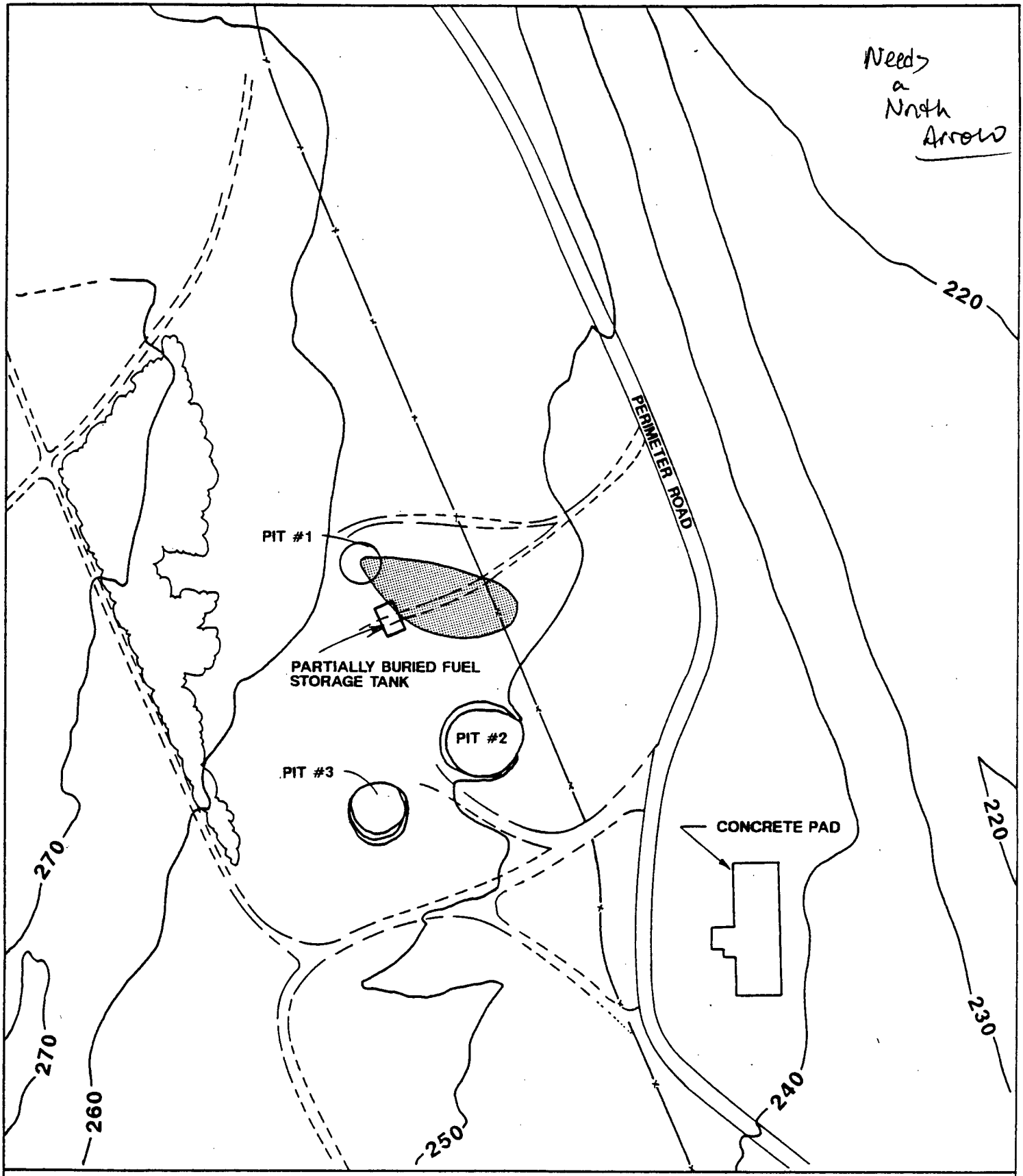
1.2.1 Site Description and History

FT-002 is located on the western side of the base, southeast of former landfill LF-022, and to the west of the perimeter road and runway. The site encompasses three pits in which waste fluids (e.g., fuels and solvents) were ignited for fire-fighting training activities from 1970 to 1989. The oldest pit is designated as Pit #1, the second-oldest pit is designated as Pit #2, and the most recently active pit is Pit #3 (Figure 1-2). Prior to construction of Pit #1 in 1970, fire-training activities took place in an area north of the fire-training pits and south of landfill LF-022. Fire-training activities in this area began in the middle to late 1950s. During fire-training activities, the ground was first saturated with water, and waste fuel and solvents were then poured onto the ground and ignited. Some of the fuel and non-combustible fluids seeped into the ground. From 1970 to 1980, the fire-training pits consisted only of sand and gravel depressions which were also saturated with water before fuel was added and ignited. In 1980, Pit #1 was deactivated, and cement-stabilized soil liners were constructed in the two remaining pits. During exercises, Pits #2 and #3 were supplied with fuel from a partially buried petroleum, oil, and lubricant (POL) storage tank. The POL was distributed by gravity feed from the tank through underground lines into the two pits. FT-002 was permanently closed to operations on May 22, 1989; fuel remaining in the storage tank and the supply lines has been removed.

Data from the SI and RI indicate the presence of free product in the soil above the water table adjacent to the southeast (downgradient) side of Pit #1. This layer consists of fuel components and chlorinated solvents (primarily jet fuel [JP-4] with low percent levels [i.e., 2%] of trichloroethene [TCE] and dichloroethene [DCE]). Constituents of the free product are also dissolved in the groundwater, forming a plume extending toward the southeast and the interior of the base. Data from groundwater sampling have been used to interpret the extent of the dissolved plume (Figure 1-3). TCE and DCE were also detected in groundwater between the fire-training pits and landfill LF-022, to the north. Surface-soil staining, and the presence of empty drums along the tree line, may be indicative of fire-training activities performed in this area from the 1950s until 1970. A conceptual model of FT-002 is shown in Figure 1-4.

1.2.2 Previous Investigations

An SI and the first phase of the RI have been conducted at FT-002. Groundwater modeling of the water table aquifer at FT-002 and a free-product recovery pilot test have also been conducted.



CONTOUR INTERVAL 10 FEET

LEGEND

FENCE

FREE-PRODUCT AREA

SCALE IN FEET

0 200 400

FIGURE 1-2
FIRE TRAINING AREA
FT-002 FREE-PRODUCT REMOVAL
ENGINEERS EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

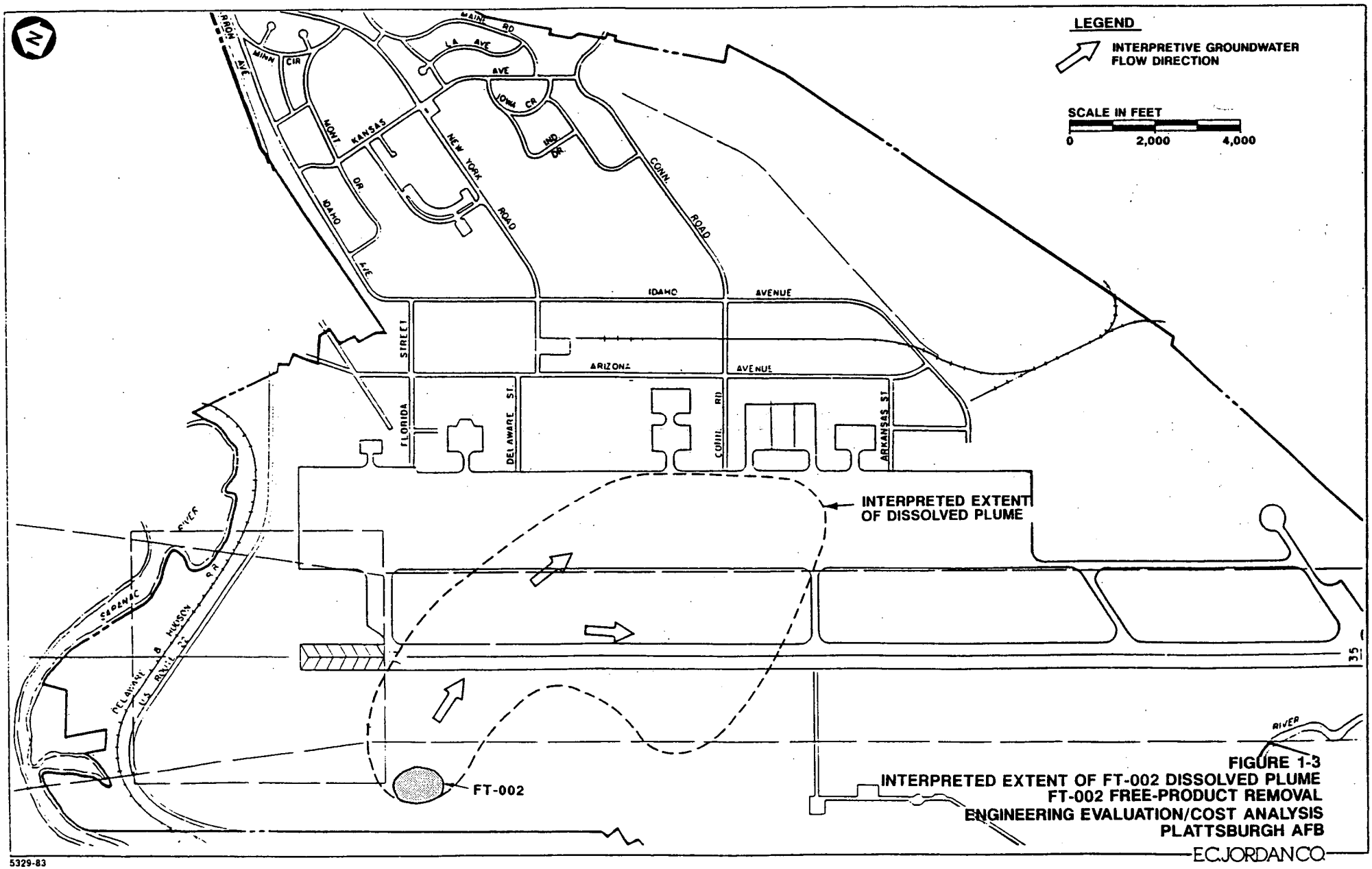


FIGURE 1-3
INTERPRETED EXTENT OF FT-002 DISSOLVED PLUME
FT-002 FREE-PRODUCT REMOVAL
ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

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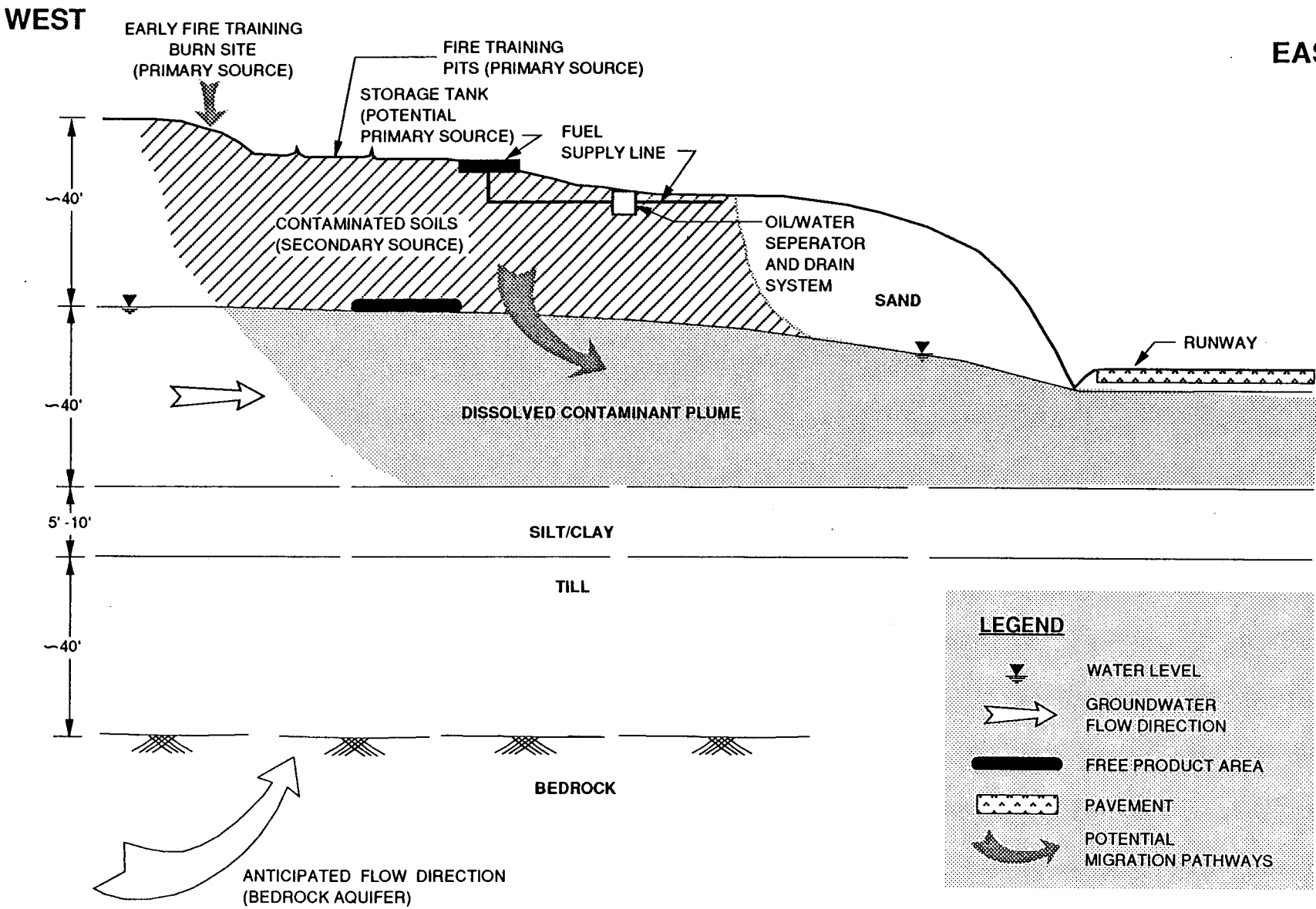

FIGURE 1-4
CONCEPTUAL SITE MODEL
FT-002 FREE-PRODUCT REMOVAL
ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

NOT TO SCALE

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1.2.2.1 Site Inspection. An SI was conducted at FT-002 during the Fall of 1987. A total of 10 monitoring wells (MW-02-001 to MW-02-010) were installed and 3 soil borings (B-02-001 to B-02-003) were drilled to determine if contaminants were present in the subsurface soils and groundwater at the site. The location of these explorations is shown in Figure 1-5.

Relatively high concentrations of fuel-related compounds and solvents were detected in soil samples collected from the boring in Pit #1 (B-02-002). At the time of groundwater sampling, free product was found on top of the groundwater in well MW-02-008, installed 60 feet downgradient from the center of Pit #1. Samples of the free product were collected and analyzed. The free product was found to consist of fuel-related hydrocarbons with low percent levels of solvents. The results of the SI have been summarized in the SI Report (E.C. Jordan Co., 1989); a summary of analytical results from groundwater sampling and soil borings conducted during the SI are included in Tables 1-1 through 1-3 for comparison with RI data.

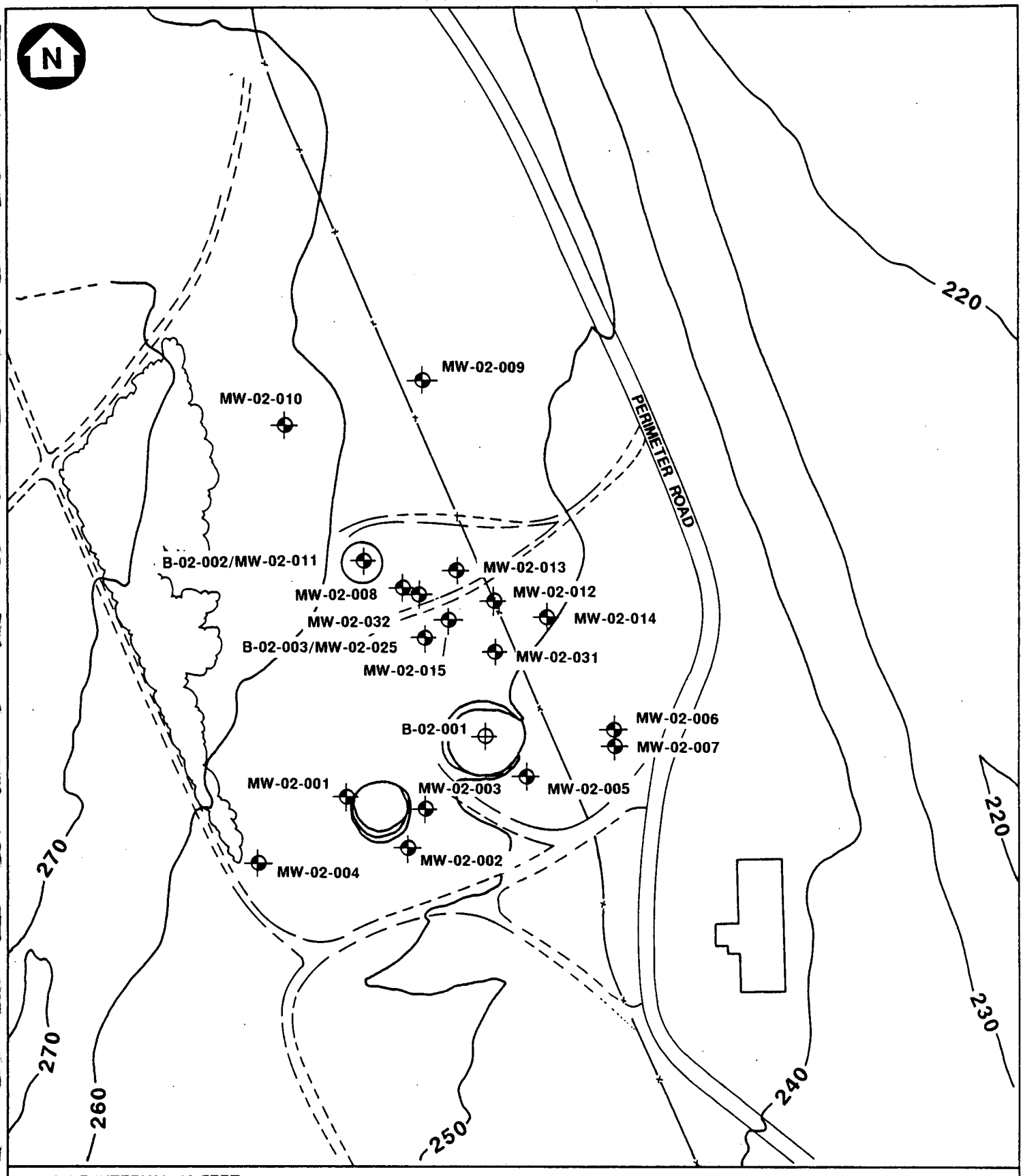
1.2.2.2 Remedial Investigation. As part of the free-product area investigation, eight new wells (MW-02-011 to MW-02-015, MW-02-025, MW-02-031, and MW-02-032) were installed during the RI. The locations of these explorations are shown in Figure 1-5, and a complete summary of the detected compounds is shown in Tables 1-1 through 1-3.

Subsurface soil samples were collected during the installation of well MW-02-011. The well is located in Pit #1 at the location of B-02-002, which was drilled during the SI. High concentrations of fuel-related compounds (i.e., benzene, ethylbenzene, toluene, and xylenes [BETX]) and solvents (2,300 to 230,000 micrograms per kilogram [ug/kg] BETX and 41 to 26,000 ug/kg TCE) were detected in all the samples collected from the boring. The highest concentrations were detected in samples from just above the water table where free product has accumulated. Contaminant concentrations detected in soil samples from below the water table dropped off sharply.

Subsurface soil samples were also collected during the installation of MW-02-025, downgradient from Pit #1. Fuel-related compounds and solvents were detected in samples collected from just above the water table but not in any samples collected from ground surface to 37 feet below ground surface. The absence of significant contamination in shallow soils at this exploration may indicate that fuels and solvents were not spilled on the soils at MW-02-025. The high concentrations of fuel-related compounds and solvents detected in samples from just above the water table may be the result of radial movement (spreading) of product that has "pooled" at the water table beneath Pit #1.

Seven of the new monitoring wells (MW-02-011 to MW-02-015, MW-02-025, and MW-02-031) were installed to help define the outer boundaries of the free-product area. Product accumulated in two of the new wells (MW-02-012 and MW-02-015) and was already present in the existing well (MW-02-008). No free product was observed in the remaining five new wells which apparently "ringed" the free-product area and defined the outer boundaries. Groundwater samples were collected from four of the five wells surrounding the free product area. High concentrations of solvents and fuel-related compounds (1,000 to 7,300 micrograms per liter [ug/L] DCE and 170 to 10,000 ug/L BETX) were detected in all the groundwater samples. As part of the free-product recovery pilot test, an additional well (MW-02-032) was installed within the free-product area. Samples of groundwater collected during the pilot test from beneath the free-product also contained high concentrations of solvents and fuel-related compounds.

A sample of the product was collected from one of the wells within the free-product area. Major components of the product are fuel-related compounds and low percent concentrations of solvents. Figure 1-6 shows contours of product thickness, as interpreted from measurements taken in wells in March 1989.



CONTOUR INTERVAL 10 FEET

LEGEND

FENCE

MONITORING WELL (MW)

SOIL BORING (B)

SCALE IN FEET

0 200 400

FIGURE 1-5
FT-002 EXPLORATIONS
FT-002 FREE-PRODUCT REMOVAL
ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

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TABLE 1-1

FREE-PRODUCT AREA SOIL BORING SAMPLE ANALYSIS

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

SAMPLE LOCATION:	B-02-002**	B-02-002**	B-02-002**	B-02-002**	MW-02-011	MW-02-011	MW-02-011	MW-02-011
DEPTH:	1	9	43	46	5	10	13	15
DATE:	11/09/87	11/09/87	11/09/87	11/09/87	11/17/88	11/17/88	11/17/88	11/17/88
MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE ID:	FTITB11801	FTITB11809	FTITB11843	FTITB11846	01BS30100501XX	01BS30101001XX	01BS30101301XX	01BS30101501XX
VOLATILE ORGANIC COMPOUNDS UNITS: ug/kg	CRDL							
Acetone	10	-	-	-	-	-	-	-
1,2-Dichloroethene (total)	5	12	-	-	7 J	-	33 J	-
Trichloroethene	5	29	-	16000	41 J	-	510 J	2200
Benzene	5	6	-	-	-	-	-	-
Toluene	5	110 D	-	55000	310 EJ	98 J	2100 DJ	3400 J
Ethylbenzene	5	130	24	80000	72 J	120 J	2300 DJ	2300 J
Styrene	5	-	-	-	26 J	-	-	-
Xylenes (Total)	5	900 D	380	240000	1900 EJ	4500 EJ	55000 EJ	29000 EJ
SEMI-VOLATILE ORGANIC COMPOUNDS UNITS: ug/kg	CRDL							
1,3-Dichlorobenzene	330	-	NR	-	NR	-	-	-	-
1,4-Dichlorobenzene	330	-	NR	-	NR	-	-	-	-
1,2-Dichlorobenzene	330	-	NR	-	NR	-	-	-	-
1,2,4-Trichlorobenzene	330	-	NR	-	NR	-	-	1600 J	1200 J
Naphthalene	330	-	NR	2000 D	NR	-	-	3600 J	2500 J
4-Chloroaniline	330	-	NR	-	NR	2800 J	-	-	-
2-Methylnaphthalene	330	4400	NR	4200 D	NR	8500 J	4100 J	7800 J	6600 J
bis(2-Ethylhexyl)phthalate	330	-	NR	950	NR	-	-	-	-
Fluorene	330	-	NR	1800	NR	-	-	-	-
Phenanthrene	330	790	NR	3900	NR	-	-	-	-
Pyrene	330	620	NR	-	NR	-	-	-	-
UNITS: mg/kg	DL							
Petroleum Hydrocarbons	25	-	2900	-	41	3500	1800	6600	3800
METALS UNITS: mg/kg	ANALYTICAL METHOD / CRDL							
Lead	P/F / 1	1200	21	6.4 *	1.3 *	NR	NR	NR	NR

** = unvalidated data from the Site Inspection

10-Jul-90

TABLE 1-1 (Continued)

FREE-PRODUCT AREA SOIL BORING SAMPLE ANALYSIS

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

SAMPLE LOCATION:	MW-02-011	MW-02-011	MW-02-011	MW-02-011	MW-02-011	MW-02-011	MW-02-011	MW-02-011
DEPTH:	20	30	38	38	40	43	43	50
DATE:	11/17/88	11/17/88	11/17/88	11/17/88	11/17/88	11/17/88	11/17/88	11/17/88
MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE ID:	01BS30102001XX	01BS30103001XX	01BS30103801XX	01BS30103801DX	01BS30104001XX	01BS30104301XX	01BS30104301DX	01BS30105001XX
VOLATILE ORGANIC COMPOUNDS UNITS: ug/kg	CRDL							
Acetone	10	2500	-	-	-	-	-	-	-
1,2-Dichloroethene (total)	5	-	-	-	-	-	-	-	-
Trichloroethene	5	26000	6800	10000 D	1200	4900	-	-	-
Benzene	5	-	-	-	-	-	-	-	-
Toluene	5	13000 J	5900 J	16000 DJ	6800 J	20000 J	-	-	-
Ethylbenzene	5	11000 J	5100 J	14000 DJ	11000 J	41000 J	1500 J	1500 J	8 J
Styrene	5	-	-	-	-	-	-	-	-
Xylenes (Total)	5	92000 EJ	26000 J	65000 DJ	54000 EJ	170000 EJ	-	-	32 J
SEMI-VOLATILE ORGANIC COMPOUNDS UNITS: ug/kg	CRDL							
1,3-Dichlorobenzene	330	2500 J	-	-	-	-	-	-	-
1,4-Dichlorobenzene	330	5200 J	-	-	-	-	-	-	-
1,2-Dichlorobenzene	330	20000 DJ	3300 J	-	-	-	-	-	-
1,2,4-Trichlorobenzene	330	460 J	-	-	-	-	-	-	-
Naphthalene	330	5100 J	6800 J	3600 J	5100 J	11000 J	-	-	-
4-Chloroaniline	330	-	-	-	-	-	-	-	-
2-Methylnaphthalene	330	6100 DJ	16000 J	10000 J	13000 J	30000 J	8000 J	12000 J	-
bis(2-Ethylhexyl)phthalate	330	-	-	660 J	-	2100 J	1800 J	-	-
Fluorene	330	-	-	-	-	-	-	-	-
Phenanthrene	330	-	-	-	-	-	-	-	-
Pyrene	330	-	-	-	-	-	-	-	-
UNITS: mg/kg	DL							
Petroleum Hydrocarbons	25	3800	3000	5400	4700	19000	5500	6500	100
METALS UNITS: mg/kg	ANALYTICAL METHOD / CRDL							
Lead	P/F / 1	NR	NR	NR	NR	NR	NR	NR	NR

** = unvalidated data from the Site Inspection

TABLE 1-1 (Continued)

FREE-PRODUCT AREA SOIL BORING SAMPLE ANALYSIS

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

SAMPLE LOCATION:	MW-02-025	MW-02-025	MW-02-025	MW-02-025
DEPTH:	13	33	37	39
DATE:	11/22/88	11/22/88	11/22/88	11/22/88
MATRIX:	SOIL	SOIL	SOIL	SOIL
SAMPLE ID:	01MS31501301XX	01MS31503301XX	01MS31503701XX	01MS31503901XX
VOLATILE ORGANIC COMPOUNDS				
UNITS: ug/kg	**CRDL**			
Acetone	10	-	-	-
1,2-Dichloroethene (total)	5	-	-	23000
Trichloroethene	5	-	-	380000 D
Benzene	5	-	-	8000 J
Toluene	5	-	-	130000 DJ
Ethylbenzene	5	-	1400 J	100000 DJ
Styrene	5	-	-	-
Xylenes (Total)	5	-	9000 J	430000 D
SEMI-VOLATILE ORGANIC COMPOUNDS				
UNITS: ug/kg	**CRDL**			
1,3-Dichlorobenzene	330	-	-	-
1,4-Dichlorobenzene	330	-	-	-
1,2-Dichlorobenzene	330	-	-	7300
1,2,4-Trichlorobenzene	330	-	-	-
Naphthalene	330	-	1900	2300	24000
4-Chloroaniline	330	-	-	-	-
2-Methylnaphthalene	330	-	2500	2900	43000
bis(2-Ethylhexyl)phthalate	330	520 J	-	-	-
Fluorene	330	-	-	-	-
Phenanthrene	330	-	-	-	-
Pyrene	330	-	-	-	-
UNITS: mg/kg	**DL**			
Petroleum Hydrocarbons	25	380	770	740	14000
METALS	**ANALYTICAL METHOD**	**CRDL**			
UNITS: mg/kg				
Lead	P/F	1	NR	NR	NR	NR

** = unvalidated data from the Site Inspection

TABLE 1-1 (continued)

FREE PRODUCT AREA SOIL BORING AND SAMPLE ANALYSIS

FT-002 FREE PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

NOTES:

J - Indicates an estimated value because value is below the contract CRDL or all quality assurance criteria were not met during analysis.

E - Indicates that the concentration report exceeded the calibration range of the analysis method and that sample should have been diluted and reanalyzed.

D - Indicates that the sample required dilution prior to analysis to bring the detected value within the calibration range of the method analysis.

NR - Analysis not requested.

"-" - Analyte analyzed for but not detected.

10-Jul-90

TABLE 1-2

FREE-PRODUCT AREA MONITORING WELL SAMPLE ANALYSIS

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

SAMPLE LOCATION:		MW-02-011	MW-02-014	MW-02-025	MW-02-031	MW-02-032
DEPTH:		46	37	40	36	48
DATE:		01/18/89	01/18/89	01/18/89	01/18/89	**
MATRIX:		WATER	WATER	WATER	WATER	WATER
SAMPLE ID:		01MW301XXX01XX	01MW304XXX01XX	01MW315XXX01XX	01MW337XXX01XX	**
VOLATILE ORGANIC COMPOUNDS UNITS: ug/L	CRDL					
1,2-Dichloroethene (total)	5	1000 D	7300	4300	5000 D	12000
2-Butanone	10	32 J	R	R	R	-
Trichloroethene	5	390 D	-	-	-	6400
Benzene	5	30	-	550 J	720	260
Toluene	5	99	1700 J	4200 J	2100 D	1200
Ethylbenzene	5	7	850 J	470 J	1000	590
Xylenes (Total)	5	37	3000 J	5000 J	3400 D	1900
SEMI-VOLATILE ORGANIC COMPOUNDS UNITS: ug/L	CRDL					
1,2-Dichlorobenzene	10	-	-	-	-	10
Phenol	10	-	10	-	-	10
2-Methylphenol	10	-	-	10	-	10
4-Methylphenol	10	-	79 J	22 J	32 J	94
2,4-Dimethylphenol	10	-	33	12	16 J	26
Naphthalene	10	-	48	51	48	31
2-Methylnaphthalene	10	-	23	21	22	20
bis(2-Ethylhexyl)phthalate	10	-	-	24 J	110	-
METALS UNITS: ug/L	ANALYTICAL METHOD / CRDL					
Lead	P/F / 5	NR	NR	10	NR	5
Aluminum	P / 200	1650	-	NR	-	-
Arsenic	F / 10	-	15	NR	15	5
Calcium	P / 5000	49200	65300	NR	98400	72000
Chromium	P / 10	16	-	NR	-	-
Iron	P / 100	2670	15700	NR	20800	16000
Magnesium	P / 5000	19600 J	11200 J	NR	16300 J	18000
Manganese	P / 15	87	69	NR	79	920
Potassium	P / 5000	-	7470	NR	-	2200
Sodium	P / 5000	20900	10700	NR	6420	20000
Zinc	P / 20	-	77 JB	NR	151	37

** = EIGHT SAMPLES WERE COLLECTED DURING THE FREE-PRODUCT RECOVERY PILOT TEST FROM 11/7-15/89; THE HIGHEST DETECTED CONCENTRATIONS ARE SHOWN; THE ANALYTICAL METHODS WERE DIFFERENT THAN THOSE USED FOR OTHER GROUNDWATER SAMPLES AND DATA WAS NOT VALIDATED.

TABLE 1-2 (continued)
FREE PRODUCT AREA SOIL BORING AND SAMPLE ANALYSIS
FT-002 FREE PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

NOTES:

J - Indicates an estimated value because value is below the contract CRDL or all quality assurance criteria were not met during analysis.

B - Indicates the analyte was detected in both the sample and associated method blank.

D - Indicates that the sample required dilution prior to analysis to bring the detected value within the calibration range of the method analysis.

R - Indicates that data are not useable because quality control criteria were not met.

NR - Analysis not requested.

"-" - Analyte analyzed for but not detected.

10-Jul-90

TABLE 1-3

FREE-PRODUCT AREA PRODUCT WELL SAMPLE ANALYSIS

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

SAMPLE LOCATION:		MW-02-008**	MW-02-008	MW-02-015
DEPTH:		40	40	37
DATE:		12/11/87	01/19/89	01/19/88
MATRIX:		PRODUCT*	PRODUCT*	PRODUCT*
SAMPLE ID:		JMW108XX01	01MW108XXX02XX	01MW305XXX01XX
VOLATILE ORGANIC COMPOUNDS				
UNITS: ug/kg	**CRDL**			
1,2-Dichloroethene (total)	5	800000	840000	390000
Trichloroethene	5	21000000	11000000	8000000 D
Benzene	5	380000 J	-	210000
Toluene	5	3000000	1800000	3000000 D
Ethylbenzene	5	1700000	1000000	1800000 D
Xylenes (Total)	5	7000000 B	4600000	8000000 D
Methylene Chloride	5	160000 JB	-	-
Acetone	10	690000 JB	-	-
2-Butanone	10	-	-	-
SEMI-VOLATILE ORGANIC COMPOUNDS				
UNITS: ug/kg	**CRDL**			
1,4-Dichlorobenzene	330	170000 J	290000	-
1,2-Dichlorobenzene	330	850000	1300000	250000
Naphthalene	330	550000	1200000	1100000
2-Methylnaphthalene	330	960000	2000000	1800000
METALS	**ANALYTICAL METHOD**			
UNITS: mg/kg		**CRDL**		
Iron	P	20	NR	117 J	200 J
Lead	P/F	1	NR	629	587
Zinc	P	4	NR	207 J	47 J

* = Product was analyzed as a soil sample.
** = Unvalidated data from the Site Inspection.

TABLE 1-3 (continued)

FREE PRODUCT AREA SOIL BORING AND SAMPLE ANALYSIS

FT-002 FREE PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

NOTES:

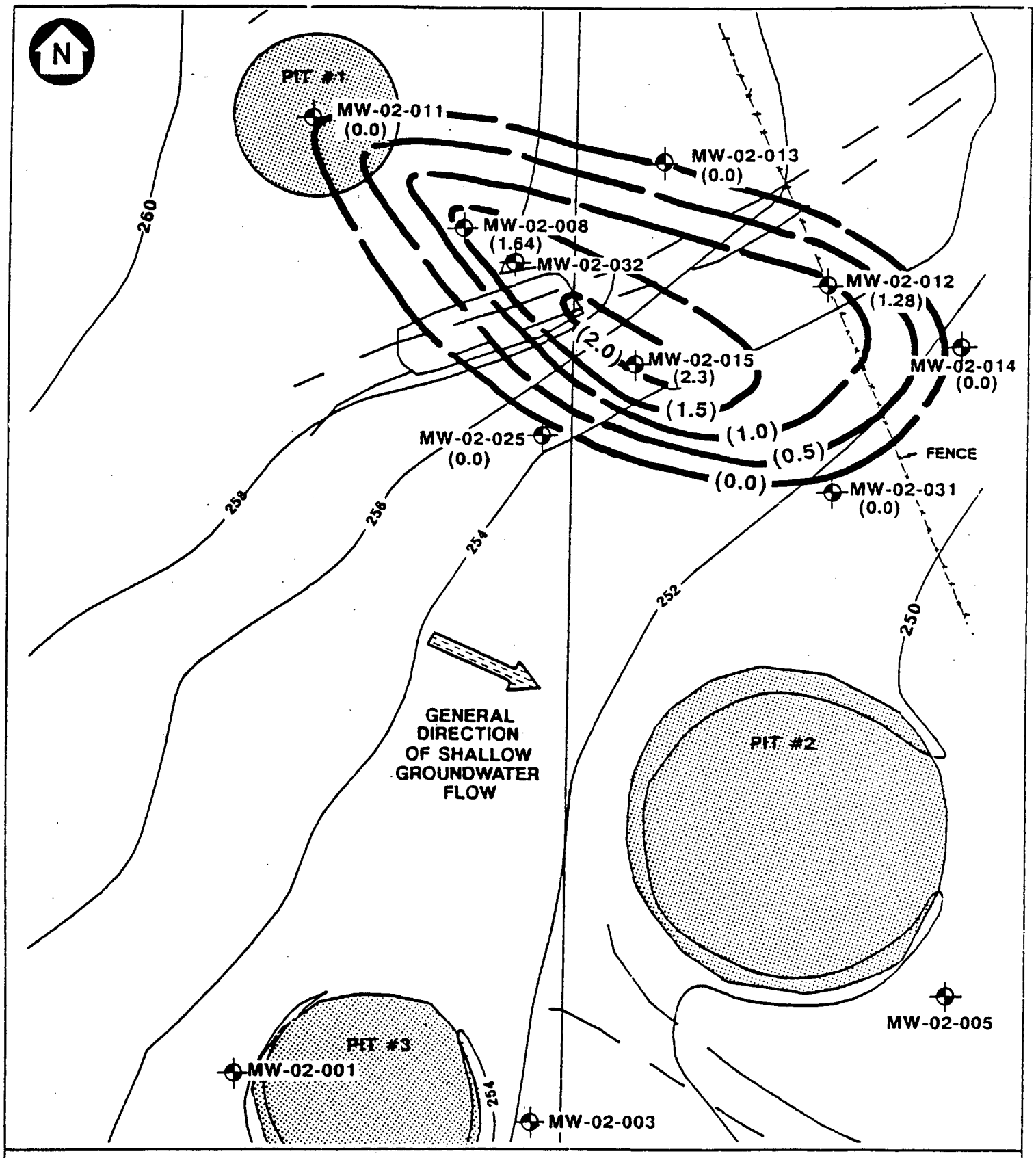
J - Indicates an estimated value because value is below the contract CRDL or all quality assurance criteria were not met during analysis.

B - Indicates the analyte was detected in both the sample and associated method blank.

D - Indicates that the sample required dilution prior to analysis to bring the detected value within the calibration range of the method analysis.

NR - Analysis not requested.

"-" - Analyte analyzed for but not detected.



LEGEND

- MONITORING WELL
- (1.64) MEASURED PRODUCT THICKNESS IN WELL (MARCH 1989)
- (0.0) PRODUCT CONTOUR INTERVAL 0.5 FEET

SCALE IN FEET

0 50 100

5329-83

FIGURE 1-6
APPARENT PRODUCT PHASE THICKNESS
FT-002 FREE-PRODUCT REMOVAL
ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

E.C. JORDAN CO.

(The thickness of free product in wells can be used as an indication of the distribution of free product in the soil but does not directly reflect the thickness of free product in the soil.)

1.2.2.3 Free-Product Recovery Pilot Test. In the Fall of 1989, a free-product recovery pilot test was conducted at FT-002 to aid in identifying removal action alternatives for the free-product downgradient from Pit #1. The test consisted of: the installation of a recovery well, an active recovery phase, and a passive recovery phase. During the active recovery phase, groundwater was withdrawn to lower the water level around the well in an effort to induce product flow towards the recovery well. At the same time, a product pump removed the product that accumulated in the well. Groundwater samples were collected for chemical laboratory analysis during this phase. During the passive recovery phase, only the product pump was operated (i.e., the water table was not depressed).

Product was recovered during both the active and passive phases of the pilot test. The rate of recovery during the passive phase of the pilot test was less than 1 gallon/day; approximately 65 gallons/day were recovered during the active phase. The pilot test demonstrated that product can be recovered from the formation, however, recovery rates and the ratio of groundwater discharged to product recovered achieved during the pilot test may not be representative of a long-term recovery operation because of the highly variable nature of product recovery rates. During the active recovery phase, there was an apparent decrease in the ratio of discharged groundwater to recovered product. The reason for this decrease and its relationship to the changing groundwater pumping rates is not understood. Because of the uncertainty involved with interpreting this data and the short duration of the test, groundwater to product ratios cannot be predicted for any particular groundwater pumping rate. It is also difficult to project the time required to complete product recovery based on short duration tests and the wide range of free-product estimates. The details and results of the pilot test ~~will be~~ are contained in the Free-Product Recovery Pilot Test Technical Memorandum (E.C. Jordan Co.,1990: ~~under preparation~~). Groundwater quality data from samples collected during the pilot test have been incorporated into Tables 1-1 through 1-3.

(?)

(what are these estimates and why are cost ranges specified (see Alliance Comment))

1.2.2.4 Groundwater Modeling. Prior to conducting the free-product recovery pilot test, a simple groundwater model of the aquifer system at FT-002 was constructed to aid in the development of the active phase of the pilot test. The model provided an estimate of the pumping rate required to maintain a drawdown of 3 feet in the recovery well. A maximum drawdown of 3 feet was selected in order to limit any possible long-term contamination of the groundwater that may result from lowering the product phase below the normal water-table level where residual product might collect in the soil matrix. The pumping rate was then used to estimate the volume of groundwater that would be removed from the aquifer during the test and plan for its disposal.

After the success of the active phase of the pilot test, the aquifer-drawdown/product-recovery alternative was determined to be a feasible option for the removal of the free-product layer at FT-002. Additional groundwater modeling was performed to assess the effects that a full-scale system would have on the aquifer under a variety of well locations, pumping rates, and groundwater disposal options. Modeling scenarios were developed to determine the potential impact of reinjection alternatives on the areal extent of the dissolved plume associated with FT-002. The modeling was also intended to improve the effectiveness and efficiency of free product removal, and provide anticipated performance information for the remedial design.

how?

A technical memorandum explaining the results of the modeling was developed and distributed to NYSDEC and USEPA. Based on the results of the groundwater modeling, it was determined that discharge of treated groundwater to surface

water and reinjection of treated groundwater outside the dissolved plume were both viable options. The modeling also showed reinjection of treated groundwater within the dissolved plume to be a feasible alternative; however, it has been eliminated from further consideration due to concern over the potential expansion of the dissolved plume.

1.3 REMOVAL ACTION JUSTIFICATION

The NCP states that a removal action may be conducted at a site when a threat to public health or welfare or the environment is determined. An appropriate removal action is undertaken to abate, minimize, stabilize, mitigate, or eliminate the release or the threat of release at a site. Section 300.415 of the NCP outlines factors to be considered to determine the appropriateness of a removal action (e.g., high levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate; or a threat of fire or explosion).

Once it has been determined that a removal action is appropriate, a determination is made whether the removal is a "classic emergency", "time-critical" removal or "non-time-critical" removal. "Classic emergencies" are those removals where response actions must begin within hours or days after the completion of the site evaluation. "Time-critical" removals are those removals where, based on a site evaluation, it is determined that there is less than six months available before response activities must begin on-site. "Non-time-critical" removals are those removals where it is determined that there is more than six months available before response actions must begin.

On January 18, 1990, the USEPA Region II and NYSDEC Project Managers for Plattsburgh AFB verbally concurred that a removal action for the free product at FT-002 was warranted to substantially reduce a continuing source of contaminants to the groundwater. On July 23, 1990, Plattsburgh AFB submitted to USEPA a Removal Assessment letter, formally identifying the "non-time-critical" removal action for FT-002 free product. Although the free product is a major source of contaminants to the groundwater, direct contact with the free product is not a concern and drinking water supplies are not currently being affected. Therefore, USEPA requested that Plattsburgh AFB prepare an EE/CA to document the analysis of potential removal alternatives in support of the "non-time-critical" removal action.

2.0 IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

Removal action objectives and site-specific considerations are developed as a basis for identifying appropriate removal action alternatives. Response objectives are generally aimed at protecting public health and the environment, and are based on the contaminant(s) of concern, exposure route(s), and receptor(s). Applicable or Relevant and Appropriate (ARARs) that establish clean-up standards are also used to determine response objectives.

Subsection 2.1 presents the removal action objective and scope; Subsection 2.2 presents the ARARs for the FT-002 removal action; and Subsection 2.3 discusses the removal action schedule.

2.1 REMOVAL ACTION OBJECTIVES AND SCOPE

The soil near the water table immediately downgradient of fire training pit #1 is saturated by product that consists of fuel-related compounds and solvents. Because the product has reached the saturation point of the soil, it can flow through the soil in response to gravity. The product that flows through the soil is referred to as free product and represents approximately 20 to 40 percent of the total product volume (Testa, 1989). A reservoir of free product has formed at the water table and is acting as a source of groundwater contamination.

The free product acts as a continuing source of groundwater contamination and should be removed. The following response objectives were developed based on future use considerations:

- remove free product to mitigate off-site migration of contaminated groundwater; and
- remove free product to limit the potential risks if groundwater is used as a potable source in the future.

FT-002 removal action objectives were not developed based on current ecological and/or public health exposure and risk considerations. The free product is at least 30 feet below ground surface, FT-002 is in a relatively isolated area of the base, and groundwater at the site is not being used as a drinking water source. Therefore, there currently are no exposure routes or receptors associated with the free product at FT-002.

The removal action will address the free product which is a major source of contamination. However, because the free product represents only a percentage of the product in the soil, 60 to 80 percent of the product will remain in the soil. Although the unrecovered product is relatively immobile because it is retained on the soil particles, it may continue to be a potential source of contamination to groundwater. Contaminants may be leached from the soil by infiltrating precipitation or possibly by the seasonal groundwater table fluctuation through the contaminated soil zone. Residual product and groundwater at FT-002 will not be addressed by this removal action. Only the groundwater removed from the aquifer as part of the free-product removal will be treated. Both the residual product in the soil and the groundwater will be addressed by future remedial measures.

The amount of product in soil is usually estimated by observing the thickness of product measured in a well (apparent thickness). However, the relationship between apparent thickness and the actual thickness of the product in the formation is not well defined. There is no widely accepted method for using apparent thickness to calculate actual product thickness in the formation. Because of this uncertainty, accurate volume estimates are difficult. The

product volume estimates for FT-002 have been calculated using several different methods (Testa, 1989 and Farr, 1989). Based on these methods, total product volume estimates range from 30,000 to 125,000 gallons.

The amount of the product that can be recovered through pumping depends on the physical properties of both the product and soil. Typically, 20 to 40 percent of the product is recoverable (Testa, 1989). Given this range of product recovery and product volume estimates, the volume of recoverable product at FT-002 has been estimated to be 6,000 to 50,000 gallons.

2.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

ARARs are federal and state public health and environmental requirements used to (1) evaluate the appropriate extent of site cleanup, (2) scope and formulate remedial action alternatives, and (3) govern the implementation and operation of a selected remedial action. CERCLA, as amended by SARA, and the NCP require that removal actions attain ARARs to the greatest extent practicable, considering the exigencies of the circumstances. In determining whether compliance with ARARs is practicable, the urgency of the situation and the scope of the removal action is considered.

Section 120 of CERCLA provides guidelines for the remediation of hazardous constituents released from federal facilities. CERCLA requires that federal facilities be subject to and comply with CERCLA, both procedurally and substantively, in the same manner and to the same extent as any nongovernment entity. Therefore, all guidelines, rules, regulations, and criteria established under CERCLA (including the NCP), are applicable to Plattsburgh AFB, including the requirement to comply with federal and state ARARs.

2.2.1 Definition of ARARs

The NCP defines two ARAR components: (1) applicable requirements, and (2) relevant and appropriate requirements.

> Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are: (1) identified by the state in a timely manner, (2) consistently enforced, and (3) more stringent than federal requirements may be applicable.
>
> Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements under federal environmental and state environmental and facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate. Off-site actions are not subject to relevant and appropriate requirements.
>
> Other requirements to be considered (TBC) are federal and state nonpromulgated advisories or guidance that are not legally binding and do not have the status of potential ARARs. However, if there are no specific ARARs for a chemical or site condition, or if ARARs are not deemed sufficiently protective, then guidance or advisory criteria should be identified and used to ensure the protection of public health and the environment.

Under CERCLA Section 121(e), permits are not required for response actions conducted entirely on-site. This permit exemption applies to all administrative requirements, including approval of or consultation with administrative bodies, documentation, record keeping, and enforcement. However, the substantive requirements of ARARs must be attained.

Under the description of ARARs set forth in the NCP and SARA, state and federal ARARs are categorized as:

- chemical-specific (i.e., govern the extent of site remediation)
- location-specific (i.e., pertain to existing natural site features and man-made features such as floodplains and landfills)
- action-specific (i.e., pertain to the proposed site remedies and govern implementation of the selected site remedy)

Each category of ARARs is discussed in the following subsections.

2.2.2 Chemical-Specific ARARs

Chemical-specific ARARs are usually health- or risk-based standards that limit the concentration of a chemical found in or discharged to the environment (e.g. federal MCLs or NYSDEC Water Quality Standards). They govern the extent of site remediation by providing either actual clean-up levels, or the basis for calculating such levels, for specific media (e.g., groundwater, air, soils).

Removal actions at FT-002 are intended to address only free product on the groundwater table. Target cleanup levels for groundwater were not developed because the existing groundwater plume will be addressed as part of future remedial activities. Therefore, federal and state chemical-specific regulations relating to cleanup levels for groundwater are not ARARs for groundwater extraction at FT-002.

However, treated groundwater from the FT-002 removal action will be discharged either to surface water or reinjected to the aquifer. Chemical-specific ARARS associated with these discharges are discussed in the following paragraphs.

2.2.2.1 Surface Water Discharge of Treated Groundwater. In June 1990, surface water standards were received from NYSDEC for discharging treated groundwater to an unnamed tributary of the Salmon River at Plattsburgh AFB. These standards were developed based on Best Professional Judgement (BPJ) guidelines, established by NYSDEC for surface water discharges, and water quality-based considerations. The surface water discharge standards developed by NYSDEC for discharge to the unnamed stream are presented in Table 2-1. A discussion of these and other state and federal ARARs relating to surface water discharge is presented in the following paragraphs.

The surface water discharge standards used in the EE/CA are currently being evaluated by NYSDEC. NYSDEC standards developed for several inorganics and phenolics may change based on NYSDEC's review. Modifications to the current discharge standards may impact costs associated with removal action alternatives.

Clean Water Act - Ambient Water Quality Criteria

Federal Ambient Water Quality Criteria (AWQC) are nonenforceable guidance developed under the Clean Water Act (CWA) Section 304 and are used by states in conjunction with a designated use for the surface water body, to establish water quality standards under CWA Section 303. To determine the applicability

TABLE 2-1

TREATED GROUNDWATER DISCHARGE REQUIREMENTS

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

COMPOUND	MAXIMUM DETECTED CONCENTRATION[1]	SURFACE WATER DISCHARGE STANDARD[2]	GROUNDWATER REINJECTION STANDARD[3]
Volatiles (ug/L)			
trans-1,2-dichloroethene	12000	29	5[4*]
trichloroethene	6400	8	5*
benzene	260	6	ND[5]
toluene	1200	8	5*
ethylbenzene	590	8	5*
total xylenes	1900	8	5[6*]
Semivolatiles (ug/L)			
1,2-dichlorobenzene	10	8	4.7[7]
naphthalene	31	8	50*
total phenolics[8]	89	1	2
Inorganics (ug/L)			
iron	16000	300	600[9,10]
magnesium	17000	17000[11]	--[12]
manganese	920	2900	600[9,10**]
zinc	37	120	5000
lead	29	20	50
total suspended solids	38000	10000	--[11]

Notes:

1 Maximum concentrations detected in groundwater extracted during the free-product recovery pilot test.
2 Surface water discharge standards for the unnamed tributary of the Salmon River obtained from NYSDEC in June 1990. FT-002 Administrative Record Section 2.8, ARAR Determination for Removal Actions.
3 Groundwater reinjection standards obtained from NYSDEC in September 1990. New York State Class GA groundwater standards or guidance values (listed at 6 NYCRR Part 703.6), except as noted with *.
4 New York State guidance value for total 1,2-dichloroethene.
5 New York State Class GA groundwater standard for benzene is non-detect based on EPA analytical method 602 (detection limit is 0.2 ug/L).
6 Applies to each isomer (1,2-, 1,3- and 1,4-) individually.
7 Sum of 1,2-Dichlorobenzene and 1,4-Dichlorobenzene.
8 Achievable detection limit for total phenolics is 2 ug/l by EPA Methods 420.2 and 420.3 (New York State Methods 9065 and 9066, respectively).
9 If iron and manganese are present, the total concentration of both should not exceed 1,000 µg/L.
10 Ambient level is greater than groundwater reinjection standard received from New York State.
11 Ambient concentration naturally occurring at the site.
12 No state or federal standard available.

* New York State Department of Health MCL listed at 10 NYCRR 5-1.

** This manganese standard has not been concurred with by NYSDEC, however it is listed at 6NYCRR Part 703.6.

or relevance and appropriateness of AWQC, designated water uses and purposes for use of the potential requirements must be considered. AWQC were developed for aquatic organisms and for public health (levels are provided for exposure from both drinking water and consuming aquatic organisms, and from consuming fish alone). For surface water discharges, a permit must be obtained in compliance with the federal CWA National Pollutant Discharge Elimination System (NPDES). An NPDES permit contains discharge standards developed using AWQC and applicable state standards.

NYSDEC Division of Water Resources Regulations (New York Compilation of Rules and Regulations Title 6 [6 NYCRR], Chapter 750-758)

New York State has its own State Pollutant Discharge Elimination System (SPDES) which was used to develop technology-based and water quality-based standards for evaluating discharge to the unnamed stream. In developing discharge limitations, the state considers the type, quality, and quantity of discharge, as well as the discharge location and respective surface water or groundwater quality classifications. Because Plattsburgh AFB is on the NPL list, an SPDES permit does not have to be obtained, however, the substantive requirements (e.g., discharge standards and compliance monitoring) must be met.

NYSDEC Surface Water Classifications and Water Quality Standards (6 NYCRR Chapter 701, Sections 701.19 and 701.20)

New York State promulgated a surface water classification system and surface water quality standards for each class in Sections 701.19 (freshwater) and 701.20 (saline waters). There are five classifications for surface water: AA, A, B, C, and D. Class AA is suitable for human consumption; Class A is suitable for human consumption with treatment; Class B is suitable for contact recreation; Class C is suitable for fishing and fish propagation, and may be suitable for contact recreation; and Class D is suitable for fishing. Each class has specified standards for coliform, pH, and dissolved oxygen. The higher classes have standards for parameters such as total dissolved solids, turbidity, color, taste, and odor. Based on information received from NYSDEC, the Salmon River is a Class C freshwater and its tributaries are Class D freshwaters.

New York State Division of Water Technical and Operational Guidance Series (1.3.4): BPJ Methodologies

This guidance, although not considered an ARAR, does qualify as a criterion, advisory, or guideline to be considered (i.e., TBC). The document outlines procedures and guidelines for the application of BPJ to the determination of effluent limits, designed to satisfy the technical requirements of the CWA. The guidance applies to the preparation of SPDES permits for direct discharges to surface waters from point sources other than a publicly owned treatment works (POTW).

The guidance was originally not applicable to groundwater discharges; however, NYSDEC has applied the BPJ guidelines for reinjection of treated groundwater into dissolved groundwater plumes. As discussed in Subsection 1.2.2.4, reinjection of treated groundwater into the dissolved plume was eliminated from consideration as a discharge option because of the potential for the discharge to expand the boundaries of the existing plume.

Technical requirements of the CWA include (1) Best Practicable Control Technology Currently Available (BPT) by July 1, 1977; (2) Best Available Technology Economically Achievable (BAT) by July 1, 1984 for toxic and non-conventional pollutants; (3) Best Conventional Pollutant Control Technology (BCT) by July 1, 1984; and (4) Best Management Practices (BMP) for plant site

runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material or product storage areas.

Effluent limitations are based on promulgated effluent guidelines and standards where they exist and are applicable; where they do not exist or do not cover certain pollutants, BAT or BCT is to be determined on a case-by-case basis, using BPJ or a combination of BPJ and effluent guidelines. Listed toxic and non-conventional pollutants that are expected to be present in the stream are subject to the technology-based controls. If any of the threshold criteria listed in the guidance are exceeded, then a BAT/BPJ determination must be made and a limit established. Based on the operating experience of industries located in New York State, NYSDEC examines the treatability of the pollutants to develop attainable target levels using current, proven technologies.

As previously discussed, NYSDEC developed BPJ guidelines for the FT-002 removal action surface water discharge scenario. The guidelines were developed considering metals pretreatment, air stripping, and liquid-phase carbon adsorption as treatment technologies. However, any technology capable of achieving the surface water discharge standards could be implemented.

2.2.2.2 Reinjection of Treated Groundwater. For the groundwater reinjection scenario, treated groundwater would be reinjected to the aquifer, outside the boundary of the existing dissolved plume. Groundwater at the site is a Class GA potential drinking water source. In September 1990, NYSDEC provided to Plattsburgh AFB groundwater reinjection standards developed using the Class GA effluent standards and New York State Department of Health Drinking Water Supply MCLs (see Table 2-1). The following paragraphs briefly describe the federal and state ARARs applicable to groundwater reinjection.

Safe Drinking Water Act Regulations - National Drinking Water Regulations (40 CFR Part 141)

The Safe Drinking Water Act (SDWA) MCLs and Maximum Contaminant Level Goals (MCLGs) are ARARs for aquifers and related groundwater used as a potable water supply source. MCLs are legally enforceable federal drinking water standards; MCLGs are nonenforceable health goals established by USEPA. MCLs are commonly identified as ARARs for existing or potential future drinking water sources. MCLGs are used in cases where multiple contaminants or pathways of exposure present extraordinary risks to human health. In such cases, USEPA makes a site-specific determination of the more stringent standards. At Plattsburgh AFB, groundwater is not currently used as a potable water supply. Therefore, the MCLGs are not considered ARARs at Plattsburgh AFB. However, MCLs may be considered ARARs because groundwater in the vicinity may be considered a future water supply source.

Resources Conservation and Recovery Act Subpart F - Releases from Solid Waste Management Units (40 CFR Sections 264.90-264.101)

The Resources Conservation and Recovery Act (RCRA) concentration limits (40 CFR Section 264.94) are potentially applicable and establish three categories of groundwater protection standards: background concentrations, RCRA MCLs, and Alternate Concentration Limits (ACLs). RCRA MCLs consist of a subset of SDWA MCLs; therefore, in complying with SDWA MCLs, cleanup will be consistent with RCRA MCLs. If no MCL exists, a background level or a health-based ACL (i.e., assuming human exposure) may be developed on a case-by-case basis as a groundwater protection standard. ACLs are based on the contaminant level's potential adverse effects on groundwater quality and on hydraulically connected surface waters, considering factors such as (1) physical and chemical characteristics of the waste, (2) hydrogeological characteristics of the setting, (3) groundwater flow quantity and direction, (4) current and future groundwater uses, (5) existing quality of area groundwater, and (6)

persistence and permanence of adverse effects. Additional factors are listed in 40 CFR Section 264.94.

NYSDEC Groundwater Classification and Water Quality Standards (6 NYCRR Chapter 703)

NYSDEC promulgated a groundwater classification system and groundwater quality standards for each class of groundwater. Classifications are GA (i.e., suitable as a source of potable water), GSA (i.e., suitable as a source of potable mineral waters, for conversion to fresh potable waters, or as raw material for the manufacture of sodium chloride; usually found in a marine environment), and GSB (i.e., suitable to receive wastes). The GSB classification is only applied to waters as the Commissioner deems necessary.

The groundwater at Plattsburgh AFB is classified as GA. Section 703.6 provides effluent standards for discharges to Class GA groundwaters. NYSDEC promulgated maximum allowable concentrations for 87 substances to protect groundwater quality. If groundwater reinjection is implemented, the FT-002 removal action would attain effluent standards established for seven compounds present in FT-002 groundwater (see Table 2-1).

New York State Department of Health Drinking Water Supplies (10 NYCRR Chapter 5, Subpart 5-1)

The New York State Department of Health (NYSDOH) regulates public water supplies in the state of New York. These regulations include a program similar to the federal SDWA regulations with promulgated MCLs. In some cases, the NYSDOH MCLs are more stringent than the federal MCLs and the NYSDEC Water Quality Standards. Public drinking water supplies may not exceed NYSDOH MCLs. If groundwater reinjection is implemented, the FT-002 removal action would attain NYSDOH MCLs for six compounds present in FT-002 groundwater (see Table 2-1).

Federal Nonregulatory Criteria

In addition to the federal and state ARARs, federal nonpromulgated advisories or guidance must be considered when ARARs for specific contaminants are not available. The TBCs include USEPA Health Advisories, USEPA Risk Reference Doses, and USEPA Carcinogen Assessment Group Carcinogen Potency factors. NYSDEC groundwater reinjection standards were used for all FT-002 groundwater contaminants. Therefore, TBCs were not used to develop the FT-002 groundwater reinjection standards.

2.2.2.3 Air Emissions. The potential chemical-specific ARARs that regulate the concentration of chemicals found in air are described in this subsection.

NYSDEC Ambient Air Quality Standards (6 NYCRR Chapter 257)

NYSDEC adopted the federal ambient air quality standards for the criteria pollutants and added standards for hydrogen sulfide and fluoride. The standard most applicable to hazardous waste remedial activities is the PM_{10} standard for particulates (i.e., particulate matter less than 10 microns in size). The PM_{10} standards for particulates are 60 micrograms per cubic meter (ug/m^3) (annual geometric mean) and 150 ug/m^3 (24-hour maximum, not to be exceeded more than once a year). To apply an ambient air quality value, the maximum ambient air quality impact from the source must be determined via the emission rate and a dispersion model.

New York State Air Guide-1, Guidelines for the Control of Toxic Ambient Air Contaminants

This guideline, although not considered an ARAR, does qualify as a criterion,

advisory, or guideline to be considered (i.e., TBC). It is a screening mechanism to determine whether permits should be issued and the degree of emission control required for all applications and permits reviewed under 6 NYCRR 212. This guideline also is used to determine whether other air contaminant sources are exceeding ambient air quality standards. An acceptable ambient level has been developed for toxic air contaminants, which are classified as either high, moderate, or low toxicity. Under 6 NYCRR 701.15(d), NYSDEC is empowered to apply and enforce guidance values where there is no promulgated standard.

2.2.3 Location-Specific ARARs

Location-specific ARARs govern natural site features (e.g., wetlands, floodplains, and sensitive ecosystems) and manmade features (e.g., existing landfills, disposal areas, and places of historical or archeological significance). These ARARs generally place restrictions on the concentration of hazardous substances or on the conduct of activities solely based on the site's particular characteristics or location (e.g, RCRA landfill regulations and NYSDEC water classification regulations).

The only location-specific ARARs for the FT-002 Removal Action are NYSDEC water quality classifications. A synopsis of this regulation is presented below.

NYSDEC Water Quality Regulations (6 NYCRR Chapters 701-703)

The New York Water Quality Regulations contain state standards for surface water (Chapters 701 and 702) and groundwater (Chapter 703) classification. Section 701.2 maintains that sewage, industrial waste, or other waste discharges shall not impair the quality of any waters receiving the discharge. For the FT-002 removal action, discharges could occur to either the unnamed tributary of the Salmon River or the aquifer. New York State surface water classifications were discussed in Subsection 2.2.2.1.

Chapter 703 sets forth classifications, quality standards, and effluent standards to prevent pollution of groundwater and to protect the groundwater for use as potable water. As previously discussed, the groundwater at Plattsburgh AFB is classified as GA, which is defined as a source of potable water. Water quality standards for Class GA waters are listed in Section 703.5 of 6 NYCRR Chapter 703. Removal actions at Plattsburgh AFB must not degrade the water quality classification of the groundwater or surface water bodies.

2.2.4 Action-Specific ARARs

Action-specific ARARs are usually technology- or activity-based limitations that control actions at hazardous waste sites. Action-specific ARARs generally set performance or design standards, controls, or restrictions on particular types of activities (e.g., RCRA incinerator regulations and NYSDEC Hazardous Waste Management Regulations). To develop technically feasible alternatives, applicable performance or design standards must be considered during the development of all removal alternatives.

The following paragraphs identify ARARs that will apply to the above mentioned actions. Potential action-specific ARARs are also listed in Table 2-2 according to possible remedial action. During the evaluation of removal alternatives, each alternative will be assessed to determine compliance with the action-specific ARARs.

TABLE 2-2

POTENTIAL ACTION-SPECIFIC ARARS
FT-002 FREE PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS

PLATTSBURGH AFB

ACTION	REQUIREMENT/CITATION
General Facility Standards and Operations	RCRA - Subpart B - General Facility Standards (40 CFR Sections 264.10 - 264.18)
	RCRA - Subpart C - Preparedness and Prevention (40 CFR Sections 264.30 - 264.37)
	RCRA - Subpart D - Contingency Plan and Emergency Procedures (40 CFR Sections 264.50 - 264.56)
	RCRA - Subpart E - Manifest System, Recordkeeping, and Reporting (40 CFR Sections 264.70 - 264.77)
	RCRA - Subpart F - Releases from Solid Waste Management Units (40 CFR Sections 264.90 - 264.109)
	RCRA - Subpart G - Closure and Post Closure (40 CFR Sections 264.110 - 264.120)
	NYSDEC Final Status Standards for Owner and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (6 NYCRR Chapter 373-2)
Generators	RCRA - Standards Applicable to Generators of Hazardous Waste (40 CFR Section 262 Subparts A, B, C, D and E)
Storage	RCRA - Subpart I - Use and Management of Containers (40 CFR Sections 264.170 - 264.178)
Treatment	RCRA - Subpart X - Miscellaneous Units (40 CFR Sections 264.600 - 264.603)
	NYSDEC Hazardous Waste Management Regulations (6 NYCRR Sections 373-2.13)

TABLE 2-2
(continued)
POTENTIAL ACTION-SPECIFIC ARARS
FT-002 FREE PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS

PLATTSBURGH AFB

ACTION	REQUIREMENT/CITATION
Excavation	CAA - National Primary and Secondary Ambient Air Quality Standards for Particulate Matter (40 CFR Sections 50.6 - 50.7)
	NYSDEC Ambient Air Quality Standards (6 NYCRR Chapter 257)
Air Stripping	NYSDEC Division of Air Resources General Provisions and Permits and Certificates (6 NYCRR Chapters 200 and 201)
	New York State Air Pollution Control Regulations (6 NYCRR Chapter 3, Part 212)
Discharge of Treatment System Effluent	CWA - National Pollutant Discharge Elimination System (40 CFR Parts 122, 125)
	NYSDEC Division of Water Resources Regulations (6 NYCRR Chapters 750 - 756)
	NYSDEC Groundwater Quality Standards (6 NYCRR Chapter 703)
	NYSDEC Surface Water Quality Standards (6 NYCRR Sections 701.19, 701.20)
General Employee Operations	OSHA - General Industry Standards (29 CFR Part 1910)
	OSHA - Safety and Health Standards for Federal Service Contracts (29 CFR Part 1926)
	OSHA - Recordkeeping, Reporting, and Related regulations (29 CFR Part 1904)
To Be Considered Criteria, Advisories, or Guidance	New York State Air Guide-1, Guidelines for the Control of Toxic Ambient Air Contaminants

2.2.4.1 General Facility Standards and Operations. Many requirements promulgated under RCRA Subtitle C (Hazardous Waste Management) apply to FT-002 removal action because potential removal options may involve treatment, storage, or disposal of hazardous waste. The following subsections describe the RCRA Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR Part 264).

General Requirements. General requirements that must be instituted for removal alternatives involving construction of on-site treatment, storage, or disposal facilities (TSDFs) include (1) general facility standards for owners and operators of permitted hazardous waste facilities (Subpart B; 40 CFR Sections 264.10-264.18); (2) preparedness and prevention (Subpart C; 40 CFR Sections 264.30-264.37); (3) contingency plan and emergency procedures (Subpart D; 40 CFR Sections 264.50-264.56); (4) manifest system, record keeping, and reporting (Subpart E; 40 CFR Sections 264.70-264.77); and (5) groundwater monitoring (Subpart F - Releases from Solid Waste Management Units; 40 CFR Sections 264.90-264.109). Additionally, on-site TSDFs must meet RCRA closure and post-closure requirements (Subpart G; 40 CFR Sections 264.110-264.120). These general requirements are discussed in the following paragraphs.

General Facility Standards. General Facility Standards outline general waste analysis, security measures, inspections, training requirements, and location standards. A written waste analysis plan, specifying the parameters to be analyzed, test methods, sampling method, and frequency of analysis, must be developed and maintained on-site. In addition, the operator must prevent unknowing entry to an active site by people and livestock by (1) a 24-hour surveillance system that continuously monitors and controls entry into active areas, or (2) an artificial or natural barrier (e.g., fence), with means to control entry at all times (e.g., attendant, lock, or video monitor). Signs stating "Danger - Unauthorized Personnel Keep Out" must be posted at all entrances and in sufficient numbers to be seen from any approach. Inspections must be made to identify problems that could result in hazardous waste release or a public health threat. The owner must develop a written inspection program. All personnel must be properly trained.

Preparedness and Prevention. Preparedness and Prevention includes requirements for safety equipment and spill control. During removal action activities at FT-002, precautions must be taken to minimize the possibility of fire, explosion, or unplanned release of hazardous waste to air, soil, or surface water, which could threaten public health or the environment. The following must be available: (1) an internal communications or alarm system; (2) a telephone for contacting outside emergency assistance; (3) fire protection and spill control and decontamination equipment; and (4) water for fire protection equipment. Police and fire departments and emergency response teams must be familiarized with facility layout, operation, and hazardous waste properties.

Contingency Plan and Emergency Procedures. This regulation also outlines the requirements for the contingency plan and emergency procedures. For all site work, a contingency plan must be developed that would be implemented immediately upon fire, explosion, or release of harmful hazardous waste constituents. Plans must describe the following: (1) actions to be taken, (2) compliance with the SPCC Plan, (3) agreements with local emergency services, and (4) names, addresses, and telephone numbers of all qualified emergency coordinators in descending order of responsibility.

Manifest System, Record Keeping and Reporting. All RCRA-listed or characteristic hazardous waste transported off-site must be accompanied by a manifest; requirements for using the manifest system are outlined in 40 CFR Section 264.71. Operating records should be kept on-site, including a description and quantification of hazardous waste treatment process, storage

location (including location map), analyses records, contingency plan summary reports, and any monitoring and testing data required under 40 CFR Section 264.73 and Appendix I to 40 CFR Part 264.

Groundwater Monitoring. An on-site treatment unit must also comply with the RCRA groundwater monitoring requirements. Three specific monitoring programs can be specified: 40 CFR Section 264.98 - Detection Monitoring Program; 40 CFR Section 264.99 - Compliance Monitoring Program; and 40 CFR Section 264.100 - Corrective Action Program. General groundwater monitoring requirements are outlined in 40 CFR Section 264.97. USEPA will specify the parameters or constituents to be monitored at a facility considering factors such as the type, quantity and concentration of the waste managed at the facility, and the mobility, stability and persistence of waste constituents in the unsaturated zone beneath the waste management area.

Closure and Post-closure. 40 CFR Sections 264.110-264.120 details the general closure and post-closure requirements of hazardous waste management facilities. A closure performance standard must be met at closure that requires minimizing the need for further maintenance and controlling, minimizing, or eliminating, to the extent necessary to protect public health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, water, or atmosphere. Closure must also comply with unit-specific closure requirements as detailed in the following paragraphs. During partial and final closure periods, all contaminated equipment, structures, and soils must be properly disposed or decontaminated.

2.2.4.2 RCRA - Generators (40 CFR Part 262). Alternatives involving the movement or removal of hazardous waste will trigger RCRA generator requirements. Generators must determine if their waste is hazardous and obtain an USEPA identification number. Hazardous waste transported and disposed of off-site must be properly manifested, packaged, labeled, and marked. Hazardous waste accumulating on-site must be placed in appropriate containers or tanks (see Section 3.4.1.3).

2.2.4.3 RCRA Storage Regulations. 40 CFR Part 264 also provides regulations for specific types of storage methods. These regulations pertain to design, construction, operation, closure, and post-closure of the storage facilities.

Containers for hazardous waste must be in good condition and made of material compatible with the hazardous waste to be stored. A container holding hazardous waste must always be closed during storage, except when it is necessary to add or remove waste. In general, storage areas that store containers holding only wastes that do not contain free liquids need not have a containment system. At closure, remaining containers, liners, bases and soil containers contaminated with hazardous waste must be decontaminated or removed.

2.2.4.4 Treatment Requirements. These regulations pertain to design, construction, and operation of the treatment facilities. The types of facilities potentially included in FT-002 removal actions include metals pretreatment, air stripping, and carbon adsorption system.

RCRA - Miscellaneous Units. Miscellaneous units (e.g., groundwater treatment unit) are regulated under Subpart X (40 CFR Section 264.600). A miscellaneous unit must be located, designed, constructed, operated, maintained, and closed in a manner that will ensure protection of human health and the environment. Releases that may have an adverse affect on human health and the environment due to migration of waste constituents in the groundwater, surface water, wetlands, soils, or air must be prevented. Monitoring, testing, analytical data, and inspections must be conducted as necessary to protect human health and the environment.

NYSDEC Hazardous Waste Management and Facility Regulations (6 NYCRR Chapters 370-373)

The NYSDEC regulations governing hazardous waste identification, generation, transportation, and TSDFs are essentially equivalent to the federal RCRA

regulations. Portions of the NYSDEC hazardous waste regulations are more stringent than the federal counterparts.

NYSDEC is authorized by USEPA to administer the federal RCRA program excluding the Hazardous and Solid Waste Amendments (HSWA). However, the state is tracking the RCRA Land Ban restrictions and enforces the land disposal of certain wastes via TSDF permit restrictions.

The following list identifies individual chapters of the NYSDEC hazardous waste regulations:

6 NYCRR Chapter 371	Identification and Listing of Hazardous Waste Regulations
6 NYCRR Chapter 372	Hazardous Waste Manifest System Regulations
6 NYCRR Chapter 373	Hazardous Waste Treatment, Storage, and Disposal Facility Permitting Requirements
6 NYCRR Chapter 373	Final Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

2.2.4.5 Excavation Requirements. The following synopsis discusses regulations relating to excavation activities.

Clean Air Act - National Ambient Air Quality Standards (40 CFR Part 50)

Site remediation activities must comply with the National Ambient Air Quality Standards (NAAQS). The most relevant pollutant standard is for particulate matter less than 10 microns in size (PM_{10}) at 40 CFR Section 50.6. The PM_{10} standard for a 24-hour period is 150 ug/m^3 of air, not to be exceeded more than once a year. The PM_{10} standard is based on the detrimental effects of such particles to the lungs. Activities such as excavation will need to ensure compliance with the PM_{10} standard.

2.2.4.6 Air Stripping Requirements. The requirements described below relate to the implementation of air stripping systems.

NYSDEC Division of Air Resources Regulations (6 NYCRR Chapters 200-202, 257)

Section 201.2 prohibits construction and operation of an air contamination source (unless under order by NYSDEC) without a valid permit to construct and a certificate to operate. NYSDEC may require emissions testing, sampling, and collection of analytical data to determine compliance to regulations under Chapter 202. Depending on the environmental rating of the source, specified emission controls are required. Chapter 200 prohibits the emissions of air contaminants that exceed ambient air standards or cause air pollution. In determining emission standards, NYSDEC considers all promulgated contaminant standards, as well as levels developed under Air Guide-1. Air strippers used for groundwater treatment would need to comply with these regulations.

Site remediation activities must also comply with New York Ambient Air Quality Standards. NYSDEC adopted the federal NAAQS, and added standards for hydrogen sulfide and fluoride. The most relevant pollutant standard is for particulate matter less than 10 microns in size (PM_{10}). The PM_{10} standard for a 24-hour

period is 150 ug/m^3 of air, not to be exceeded more than once per year. The PM_{10} standard is based on the detrimental effects of such particles to the lungs. The ambient air quality standards apply to landfill vents, flares, lagoons, combustion processes, incinerators, and air strippers.

New York State Air Pollution Control Regulations (6 NYCRR Chapter 3, Part 212)

Part 212 of Chapter 3 regulates general process emission sources such as air strippers. Based on the air contaminants being emitted from the source, an environmental rating ("A" through "D") is assigned and a degree of air cleaning required for the source is specified according to the emission rate potential (i.e., pounds per hour) of the source.

New York State Air Guide-1, Guidelines for the Control of Toxic Ambient Air Contaminants

This guideline, although not considered an ARAR, does qualify as a criterion, advisory, or guideline to be considered (i.e., TBC). It is a screening mechanism to determine whether permits should be issued and the degree of emission control required for all applications and permits reviewed under 6 NYCRR 212. This guideline also is used to determine whether other air contaminant sources are exceeding ambient air quality standards. An acceptable ambient level has been developed for toxic air contaminants, which are classified as either high, moderate, or low toxicity. Under 6 NYCRR 701.15(d), NYSDEC is empowered to apply and enforce guidance values where there is no promulgated standard.

Data obtained during the FT-002 Free Product Pumping Test indicate that benzene is the only high toxicity compound present in the groundwater. According to Air Guide-1, any chemical designated as a high toxicity air contaminant must be assigned an environmental rating of "A", best available control technology (BACT) is required for the source, and 99 percent removal efficiency using BACT must be achieved.

However, Air Guide-1 also states that for any high toxicity air contaminant with an emission rate potential of less that 1.0 pound per hour (lb/hr), BACT may be waived or another degree of air cleaning will be specified by the Regional Air Pollution Control Engineer. Based on a review of the influent benzene concentrations and the surface water and groundwater discharge standards, it is estimated that the emission rate potential for benzene will be well below the 1.0 lb/hr limit. Additionally, the emission rate potential for all source volatile organic compounds (VOCs) is estimated to be below the 1.0 lb/hr limit. NYSDEC will determine if BACT can be waived or if another degree of emission control should be assigned. The actual permit and certificate would not have to be obtained, however, the substantive requirements of the regulation would have to be met.

2.2.4.7 Discharge of Treatment System Effluent. The following regulations relate to the discharge of water from treatment systems.

National Pollutant Discharge Elimination System Permit (40 CFR Part 122)

Permits are required for the discharge of pollutants from any "point source" into U.S. water. Point source means any discernable, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, vessel, or other floating craft from which pollutants are or may be discharged. U.S. waters means all waters that are currently used, were used in the past, or may be susceptible to future use in interstate or foreign commerce, including all waters subject to the ebb and flow of the tide (e.g., mudflats and sandflats).

For Plattsburgh AFB, an actual NPDES permit would not have to be obtained because the base is on the NPL list. However, the substantive portions of the permit would have to be met. The requirements of the NPDES permit include (1) compliance with applicable water quality standards and permit limitations, (2) establishment of a discharge monitoring system, and (3) routine completion of discharge monitoring records. NPDES permit limitations are developed by NYSDEC or USEPA and are based on the type, quantity , and quality of discharge, the location of the discharge, the water quality of the receiving body of water, and available treatment technologies.

NYSDEC Division of Water Resources Regulations (6 NYCRR Chapters 750-756)

The NYSDEC SPDES permit program is similar to the federal NPDES program under the CWA. Discharge of pollutants to waters of the state is prohibited without a valid SPDES permit. An existing NPDES permit or application is deemed equivalent to an SPDES permit or application. Chapter 751 identifies prohibited discharges and exemptions to the SPDES requirement. Chapter 752 identifies permit application data requirements. Chapter 753 specifies public notice and participation requirements. Under Chapter 754, Provision of the SPDES Permits, federal NPDES regulations at 40 CFR Parts 120, 125, 133, and 400 through 460 are referenced in addition to specified effluent limitations and schedules of compliance. Under Chapter 756, NYSDEC may impose monitoring, record keeping, and reporting requirements on SPDES-permitted discharges. Treatment standards for discharge are generally determined by the state on a case-by-case basis. Factors influencing the treatment standards include the composition and volume of the discharge, the classification of the receiving water body or groundwater, and the treatment technologies currently available. Discharges to surface and groundwaters are prohibited from degrading the water quality and classification. Surface water and groundwater quality classifications and standards are summarized in Subsections 2.2.2.1 and 2.2.2.2, respectively.

2.2.4.8 General Employee Operations - Occupational Safety and Health Administration Regulations (29 CFR Parts 1904, 1910, and 1926)

Federal Occupational Safety and Health Administration (OSHA) requirements regulating worker safety and employee records must be followed during all site work. These regulations include health and safety standards for federal service contracts, record keeping and reporting, and requirements such as safety equipment and procedures to be followed during site remediation.

2.3 REMOVAL ACTION SCHEDULE

The pilot test demonstrated that free product can be recovered from the soils at FT-002; however, data from the test cannot be used to accurately predict the time required to complete the removal action. Free-product recovery rates achieved during the short duration of the pilot test were consistent; however, longer tests at other sites have shown that recovery rates can vary widely over time. Even if recovery rates could be accurately predicted, the actual amount of free product in the soil is not known.

The free product removal action is expected to be in operation for a minimum of 12 months. Actual length of operation will be based on evaluation of free product removal rates determined during initial period of removal action. The FT-002 feasibility study will be accomplished during the removal action and will address the final remediation of unrecoverable product in the formation. For purposes of preparing preliminary cost estimates for the removal action alternatives, operation times are assumed to be 5 years and 15 years. Additional scheduling objectives specific to the individual removal action alternatives are considered within the evaluation of alternatives section (Section 4.0).

3.0 IDENTIFICATION OF REMOVAL ALTERNATIVES

Based on the successful recovery of free product during the active phase of the pilot test, two alternatives have been identified for the removal of free product from the soils at FT-002. Both alternatives utilize the aquifer drawdown and free-product recovery process that was evaluated during the free-product recovery pilot test. The methods for disposal of free product and treatment of groundwater are also similar for the two alternatives. However, for Alternative 1, treated groundwater would be discharged to surface water; for Alternative 2, it would be reinjected to the aquifer. The following subsections provide detailed descriptions of the two alternatives.

3.1 ALTERNATIVE 1: FREE-PRODUCT SKIMMING WITH AQUIFER DRAWDOWN; GROUNDWATER TREATMENT; AND DISCHARGE TO SURFACE WATER

Alternative 1 consists of the following basic components:

1. free-product skimming and aquifer drawdown
2. disposal of recovered product
3. treatment of extracted groundwater
4. discharge of treated groundwater to surface water

A flow diagram of the basic processes is shown in Figure 3-1.

3.1.1 Removal of Free Product from the Soils

For Alternative 1, free product removal would be accomplished using the same technology as for the pilot test. This system consists of a groundwater pump and a free-product skimming pump installed in a well. A typical system installation is shown in Figure 3-2.

When in use, the groundwater pump creates a depression in the water table providing a gradient to induce free product to flow toward the recovery well. The drawdown is maintained within a specific range by limit switches in the unit that turn the pump on and off depending on the position of the water table. The amount of drawdown is controlled by the vertical location of the unit in the well and the groundwater pump discharge rate. During the pilot test, a maximum drawdown of approximately 3 feet was maintained in order to limit any possible long-term contamination of the groundwater that may result from lowering the product phase below the normal water-table level where residual product might collect in the soil matrix. Drawdown would also be minimized during the implementation of Alternative 1 for this reason.

A free-product skimming pump would be used to withdraw free product. The skimming pump is designed to float at the product/water interface and therefore responds to water level fluctuations in the well. The product that accumulates in the well is pumped to a temporary storage tank at the ground surface. Product skimming systems are capable of reducing the thickness of hydrocarbon layers in a well to 1/10 of an inch or less.

Because drawdown will be limited, a series of wells will be required to create the desired drawdown and recover free product from the entire free-product area. Each well will be screened across the water table and will contain one set of drawdown and skimming pumps. Computer modeling, conducted as part of the pilot test, demonstrated that a series of four wells, each pumping 5 gallons per minute, should be sufficient to cover the free-product area. Four wells would also provide system flexibility and reliability and the capability of eliminating potential stagnation zones within the area by varying pumping schedules and rates.

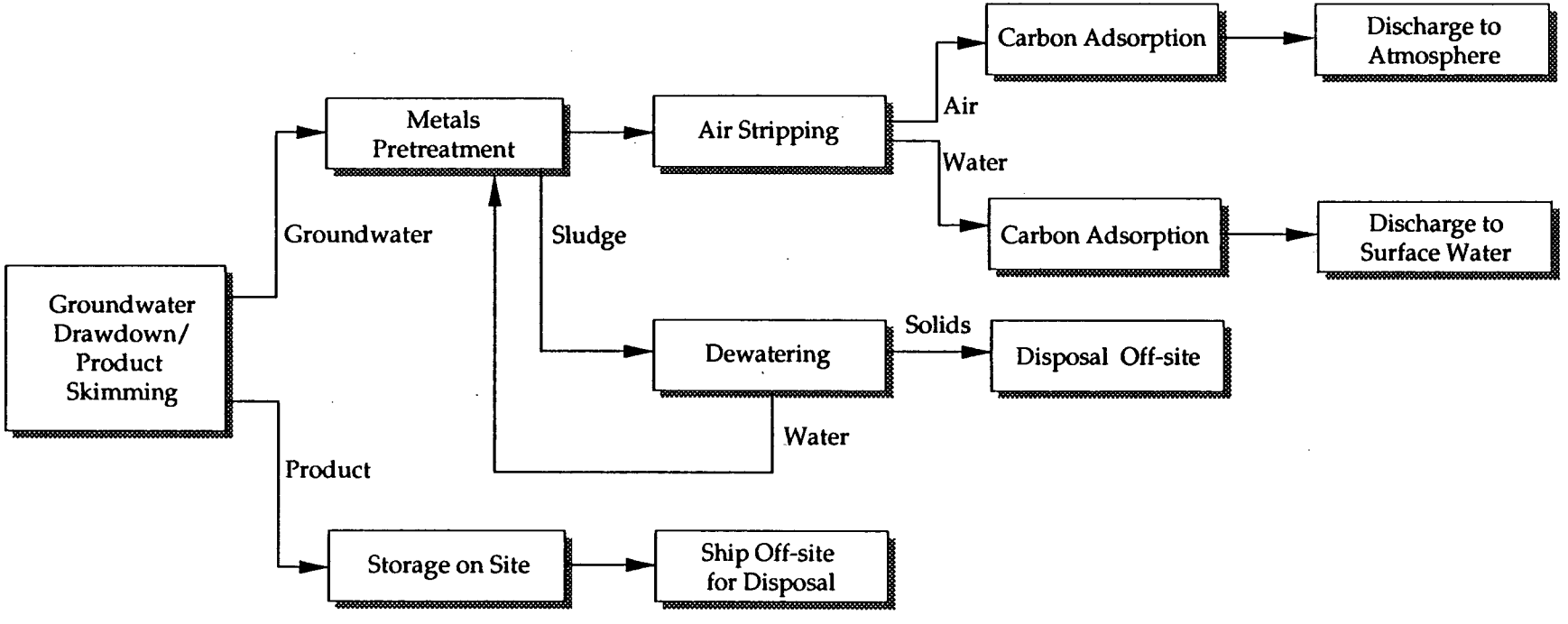


FIGURE 3-1
ALTERNATIVE 1 PROCESS DIAGRAM
FT-002 FREE PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB
E.C. JORDAN, CO.

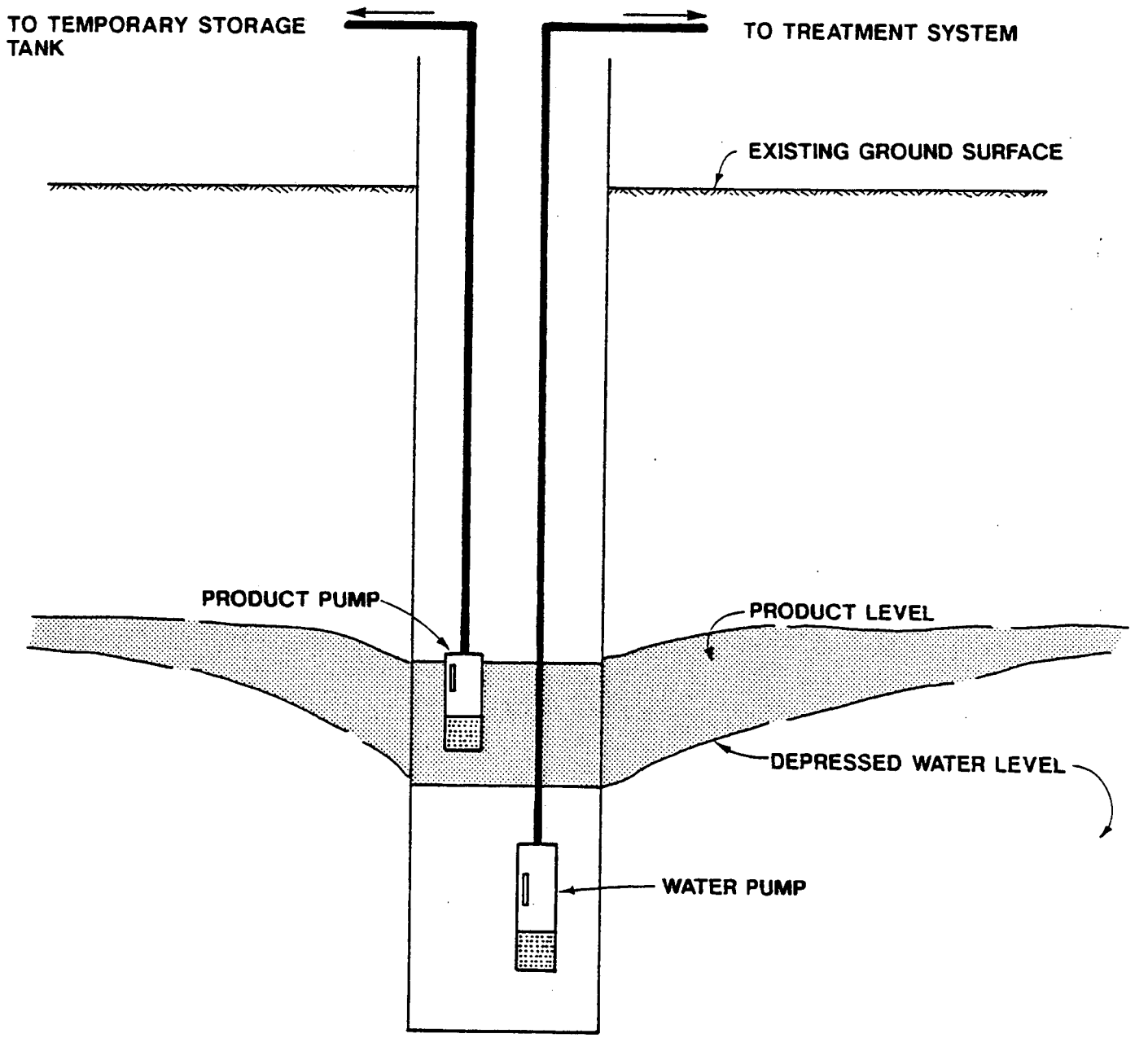


FIGURE 3-2
CONCEPTUAL MODEL OF
FREE-PRODUCT REMOVAL SYSTEM
FT-002 FREE-PRODUCT REMOVAL
ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

NOT TO SCALE

This free-product recovery technique produces recovered product and extracted groundwater as effluent streams, which must be treated and/or disposed.

3.1.2 Disposal of Recovered Product

Product recovered during the removal action will be accumulated in a temporary storage tank at the ground surface. The tank will be periodically emptied and the contents transported to an off-site facility for treatment and/or disposal.

3.1.3 Treatment of Extracted Groundwater

Because extracted groundwater will contain dissolved fuel-related compounds and solvents, treatment will be required prior to surface water discharge. The groundwater treatment system will consist of three basic treatment processes: metals pretreatment; air stripping; and carbon adsorption. Metals pretreatment will be required to prevent fouling of the air stripper by oxidized iron. Air stripping will reduce concentrations of VOCs in the extracted groundwater. Carbon adsorption will be used as a polishing step to achieve surface water discharge standards.

3.1.3.1 Metals Pretreatment. Chemical oxidation, chemical precipitation, flocculation, and clarification, filtration, and pH adjustment would be used for metals pretreatment.

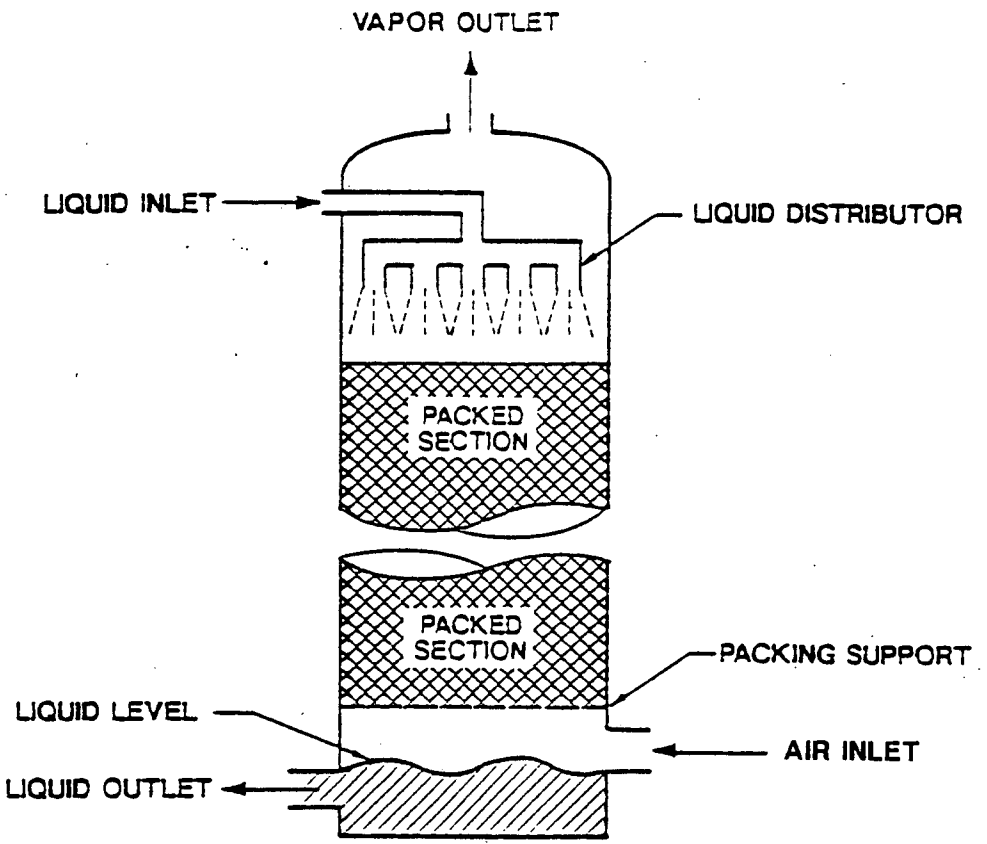
During the chemical oxidation process, strong oxidizers such as chlorine, hydrogen peroxide, and potassium permanganate are added to the water being treated. The oxidizers react with the metals dissolved in the water to form ions that will form precipitates. Chemical oxidation would be the first step in the removal of iron from the extracted groundwater.

After the precipitants have been formed, flocculating agents would be added to decrease the time required for particulates to settle out. These agents cause chemical changes that encourage small suspended particles to agglomerate into large particles that settle faster. During flocculation, the agent is added to the groundwater in a mixing tank and agitated to encourage contact between particles. Common flocculants include lime, alum, iron salts, and organic agents (i.e., polyelectrolytes).

After mixing, the water would be transferred to a clarifier, where particles settle out and form a concentrated metal sludge in the bottom of the clarifier. The sludge produced by metals pretreatment would be dewatered and sent off-site for disposal. The treated groundwater from the clarifier would then pass through a sand filter that would remove most of the remaining particulates.

3.1.3.2 Air Stripping. Air stripping is a treatment technology used to remove VOCs from water through contact with large volumes of clean air. The contaminants are transferred from the liquid phase to the gas phase, and carried off with the effluent air.

Several air-stripping methods can be used, but the packed tower design is the most common. In a packed tower, the air and water flow countercurrent to each other to improve stripping effectiveness. Contaminated water enters from the top of the column and trickles downward, through packing material, forming a thin film of water on the surface of the packing. This creates a large liquid surface area for the transfer of contaminants from the liquid to vapor phase. Air enters the base of the column and flows upward. Effluent air exits through the top of the column, while treated water exits from the base of the column. Figure 3-3 shows the cross section of a packed tower air stripper.



NOT TO SCALE

FIGURE 3-3
AIR STRIPPER CROSS SECTION
FT-002 FREE-PRODUCT REMOVAL
ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

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3.1.3.3 Carbon Adsorption. Activated carbon adsorption is a physical separation process in which organic and inorganic compounds are removed from water by sorption (i.e., the attraction and accumulation of one substance on the surface of another). As water passes through the porous carbon granules, contaminant molecules are attracted to the surface of the pores and held there by weak physical forces. Most dissolved organics and selected inorganic chemicals, including some heavy metals, can be adsorbed by activated carbon.

Much of the surface area available for carbon adsorption is found within the carbon pores created during the activation process. A controlled process of dehydration, carbonization, and oxidation of raw materials (e.g., coal, wood, coconut shells, and petroleum based residues) yields the activated carbon. As activated carbon adsorbs molecules or ions from water, the carbon pores eventually become saturated, and the exhausted carbon must be regenerated for reuse or replaced with fresh carbon. The adsorptive capacity of the carbon can be partially restored by chemical or thermal regeneration.

In a typical downflow fixed bed operation, two carbon columns are operated in series. The effluent from the lead column is monitored for "breakthrough" of contaminants. Once breakthrough is detected, carbon in the lead column is replaced or regenerated, flow is reversed, and the partially exhausted second column becomes the new lead column. By using two columns, contaminated water is prevented from leaving the system when breakthrough of the lead column occurs because the water must still pass through a second carbon column. Figure 3-4 shows two downflow carbon columns in series.

3.1.4 Discharge of Treated Groundwater to Surface Water

NYSDEC has established discharge limitations for the unnamed tributary of the Salmon River located near the Weapons Storage Area (Subsection 2.2.2.1). Once the extracted groundwater has been treated to meet the surface water discharge limits established by NYSDEC, it can be discharged to this stream. The closest discharge point is located approximately 2,400 feet south of FT-002 on the west side of Perimeter Road (Figure 3-5). The treated groundwater will be transferred from FT-002 to the discharge point via an underground gravity-flow pipeline.

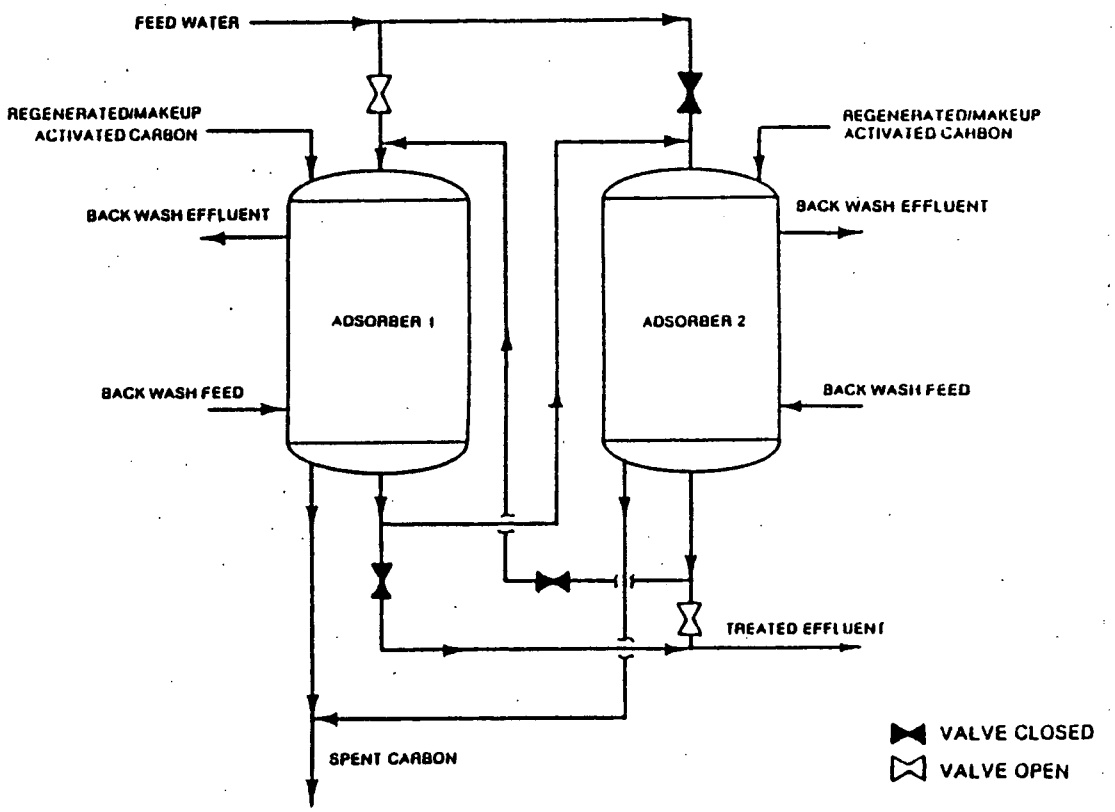
3.2 ALTERNATIVE 2: FREE-PRODUCT SKIMMING WITH AQUIFER DRAWDOWN; GROUNDWATER TREATMENT; AND REINJECTION TO THE AQUIFER

Alternative 2 consists of following basic components:

1. free-product skimming and aquifer drawdown
2. disposal of recovered product
3. treatment of extracted groundwater
4. reinjection of treated groundwater to the aquifer

Components 1 and 2 are the same as described for Alternative 1. Components 3 and 4 are described below. A flow diagram of the basic processes is shown in Figure 3-6.

TWO-VESSEL GRANULAR CARBON ADSORPTION SYSTEM



Source: USEPA, 1973a

FIGURE 3-4
GRANULAR CARBON ADSORPTION SYSTEM
FT-002 FREE-PRODUCT REMOVAL
ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

ECJORDANCO

5329-83

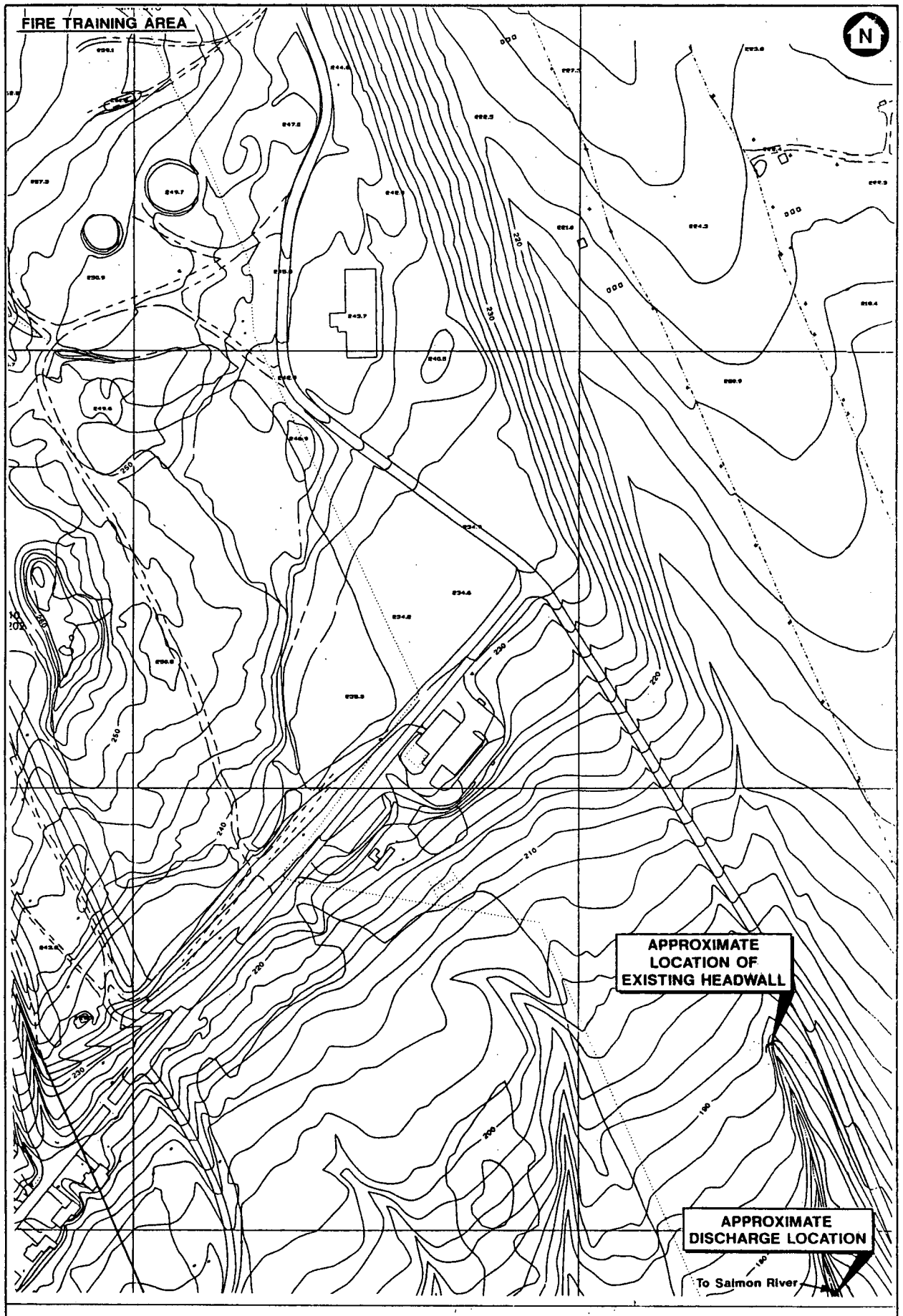


FIGURE 3-5
PROPOSED SURFACE WATER DISCHARGE POINT
FT-002 FREE-PRODUCT REMOVAL
ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

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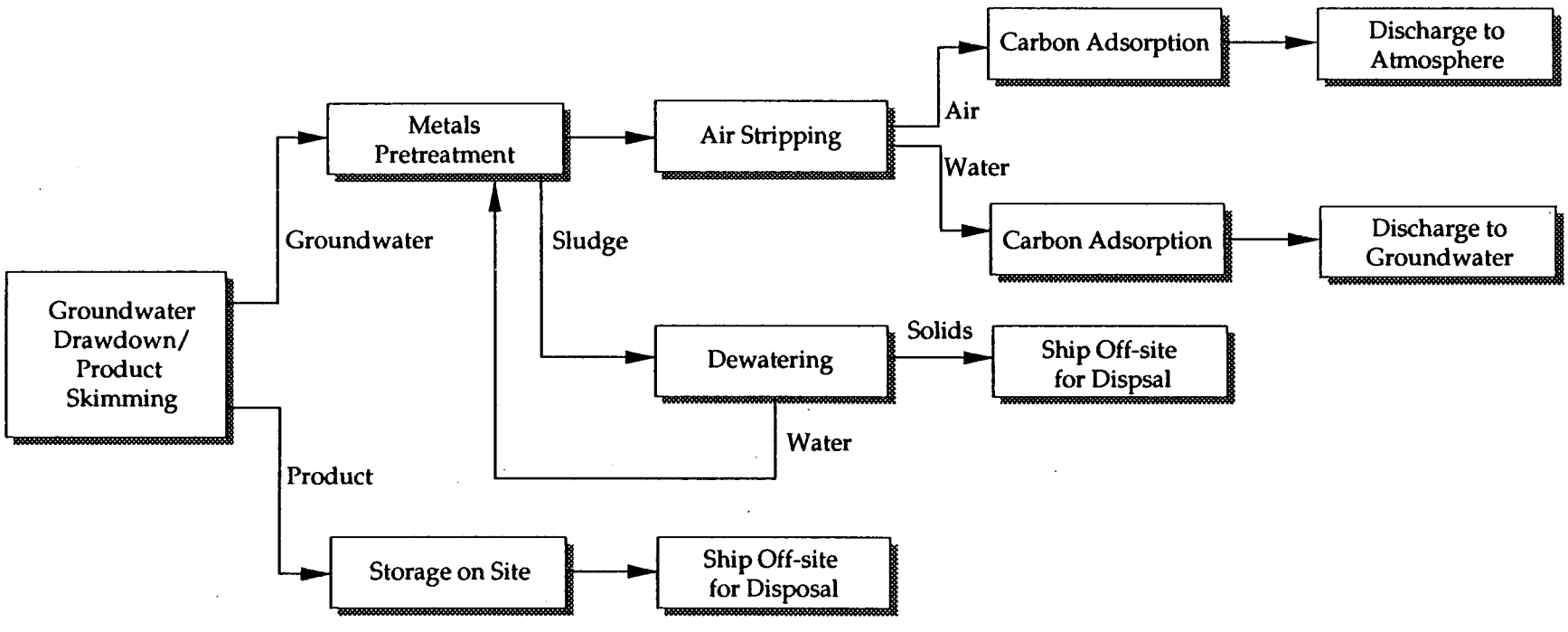


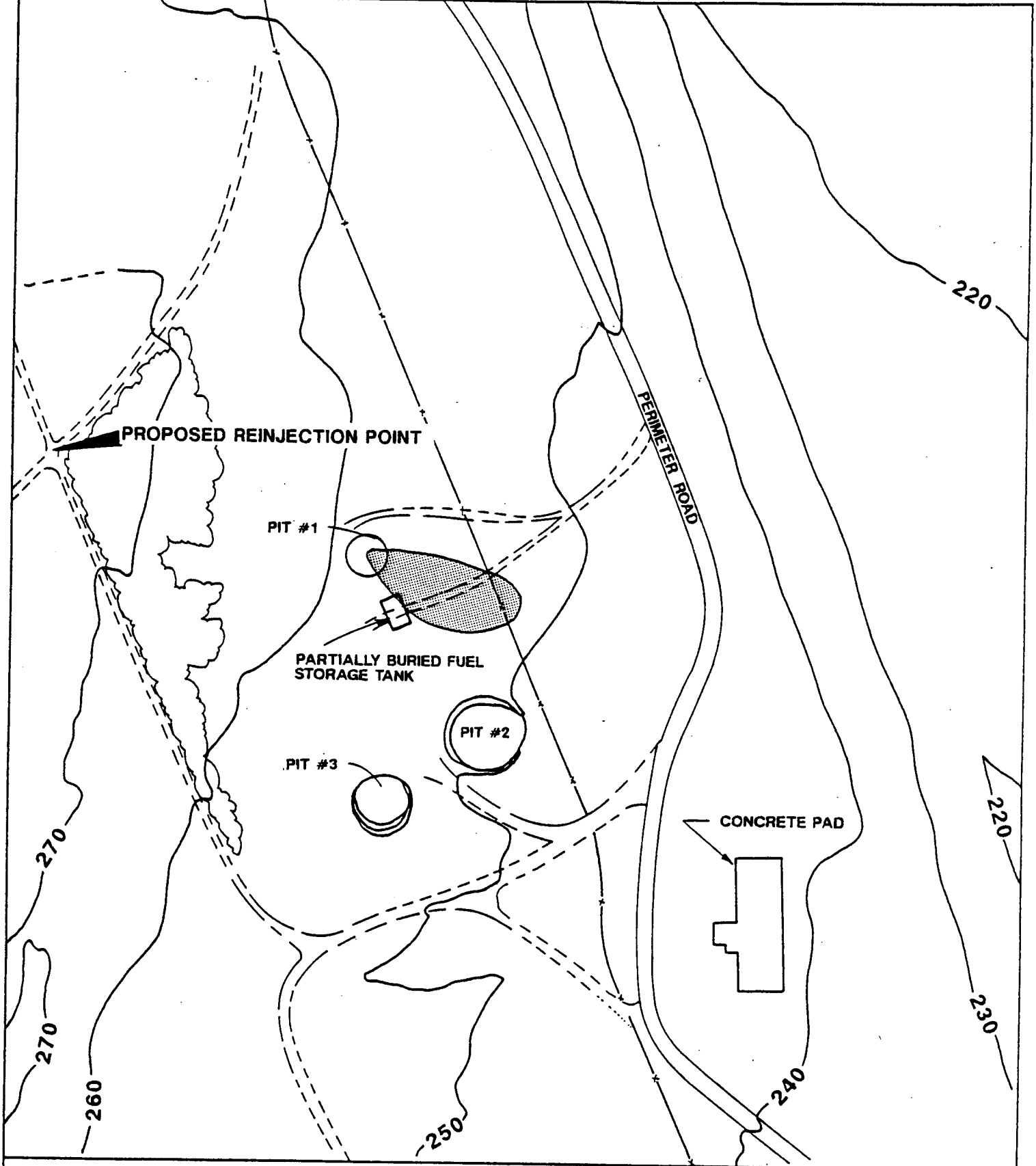
FIGURE 3-6
ALTERNATIVE 2 PROCESS DIAGRAM
FT-002 FREE PRODUCT REMOVAL ENGINEERING
EVALUATION/COST ANALYSIS
PLATTSBURGH AFB
E.C. JORDAN, CO.

3.2.1 Treatment of Extracted Groundwater

Alternative 2 uses the same treatment technologies for groundwater extracted from the aquifer as Alternative 1. However, the metals pretreatment would be required to remove iron and manganese. Sizing of the treatment units may also vary between the two alternatives because of the different discharge requirements.

3.2.2 Reinjection of Treated Groundwater to the Aquifer

Reinjection standards have been developed by NYSDEC for reinjection to the aquifer at FT-002. Wells or an infiltration gallery would be used to reintroduce treated groundwater to the aquifer upgradient from the fire training pits and the old fire training area (Figure 3-7). If wells are used, one well could be sized to handle the reinjection of treated groundwater into this highly permeable aquifer, however, two wells would provide the system redundancy necessary in the event that one well failed or required servicing.



CONTOUR INTERVAL 10 FEET

LEGEND

FENCE

FREE-PRODUCT AREA

SCALE IN FEET

0 200 400

FIGURE 3-7
PROPOSED REINJECTION POINT
FT-002 FREE-PRODUCT REMOVAL
ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

5329-83

E.C. JORDAN CO.

4.0 EVALUATION OF REMOVAL ACTION ALTERNATIVES

This section presents the evaluation of the free-product removal action alternatives identified in Section 3.0. Subsection 4.1 defines the criteria used for the evaluation and Subsection 4.2 presents the evaluation of the two alternatives with respect to the criteria.

4.1 APPROACH TO THE EVALUATION OF ALTERNATIVES

The evaluation of alternatives is intended to provide decision-makers with sufficient information to select the appropriate removal action for FT-002. The evaluation will be conducted based on the EE/CA Guidance Outline and USEPA RI/FS guidance where applicable. Each alternative is assessed with respect to the following effectiveness, implementability and cost criteria:

- Effectiveness
  - Protection of the Community during the Removal Action
  - Protection of Workers during the Removal Action
  - Environmental Impacts
  - Time until Protection is Achieved
  - Threat Reduction
  - Potential Exposure to Remaining Risks
  - Long-Term Reliability for Providing Continual Protection
  - Compliance with ARARs
- Implementability
  - Technical Feasibility
  - Availability
  - Administrative Feasibility
- Cost
  - Capital Costs
  - Annual Operation and Maintenance Costs
  - Net Present Worth

Each evaluation criteria is briefly described in Table 4-1.

4.1.1 Approach to the Evaluation of Preliminary Costs

As stated in Subsection 2.3, the removal action is expected to be in operation for minimum of 12 months. For the purpose of evaluating and comparing the alternatives, preliminary cost ranges will be provided for each alternative for the anticipated removal action operation periods of 5 years and 15 years. Therefore, the net present worth of each alternative will be presented as a range to reflect costs associated with each period of operation. The estimated costs will reflect minimum and maximum expenditures for each alternative within a -30 to +50 percent cost accuracy.

4.2 EVALUATION OF ALTERNATIVES

The evaluation of Alternatives 1 and 2 is presented in Table 4-2.

TABLE 4-1

ALTERNATIVE EVALUATION FACTORS

FT-002 FREE PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

EVALUATION FACTOR	DESCRIPTION
EFFECTIVENESS	
Protection of the Community During the Removal Action	Risks to the surrounding community resulting from implementation of the removal action such as dust from excavation activities, transportation of hazardous materials, or air quality impacts from an air stripping tower operation that may affect human health.
Protection of Workers During the Removal Action	Threats that may be posed to workers at the site, such as dust from excavation, and the protective measures that would be taken.
Environmental Impacts	Potential adverse environmental impacts that may result from implementing the removal action and protective measures that can be taken.
Time Until Protection is Achieved	Estimated time required to achieve protection from principal threats at the site (i.e., operation time required for the removal actions).
Threat Reduction	Extent to which the removal action will reduce risks or mitigate threats.
Potential Exposure to Remaining Risks	Assessment of potential for future exposure to residuals remaining on-site.

TABLE 4-1
(continued)
ALTERNATIVE EVALUATION FACTORS

FT-002 FREE PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

EVALUATION FACTOR	DESCRIPTION
EFFECTIVENESS	
EFFECTIVENESS (continued)	
Long-term Reliability for Providing Continued Protection	Potential for failure of the alternative and need for replacement, and description of potential threats from such failure or replacement.
Compliance with ARARs	Determination of whether federal and state chemical-, location-, and action-specific ARARs would be attained.
IMPLEMENTABILITY	
Technical Feasibility	Difficulties associated with the construction and operation of a technology.
	Reliability of a technology.
	Demonstrated performance of a technology under similar conditions for similar contaminants.
	Ability to attain removal action objectives.
	Impact of environmental conditions, such as terrain and climate, on implementation of a technology.
	Compatibility of the removal action with a long-term remedial action, to the extent practicable.

TABLE 4-1
(continued)
ALTERNATIVE EVALUATION FACTORS

FT-002 FREE PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

EVALUATION FACTOR	DESCRIPTION
IMPLEMENTABILITY (continued)	
Availability	Availability of necessary equipment, materials, and personnel. Availability of off-site treatment, storage, and disposal capacity, if appropriate. Monitoring requirements at completion of the removal action.
Administrative Feasibility	State acceptance of the proposed removal action alternative Activities requiring coordination with other agencies. Ability to obtain any necessary approvals or permits.

TABLE 4-1
(continued)
ALTERNATIVE EVALUATION FACTORS

FT-002 FREE PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

EVALUATION FACTOR	DESCRIPTION
COSTS	Capital costs. Annual operation and maintenance costs. Net present worth of the alternative (i.e., discounting all future costs to a common base year to evaluate expenditures that occur over different periods of time). A discount rate of 5 percent before taxes and after inflation is used to estimate net present worth (USEPA, 1988b).

TABLE 4-2

EVALUATION OF ALTERNATIVES

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

CRITERIA	ALTERNATIVE	ASSESSMENT
EFFECTIVENESS		
Protection of the Community During the Removal Action	1 & 2	Minimal impacts and/or risks to the community are expected from activities associated with the FT-002 free-product removal action.
	1 & 2	Free product would be handled on-base and transported off-site to an appropriate TSDF by a New York State-certified hazardous waste transportation service.
	1 & 2	Free product recovered from the aquifer would be stored in an aboveground container and disposed at an approved hazardous waste facility. There is low probability of direct contact exposure to the free product during the implementation of this alternative.
	1 & 2	Groundwater treatment would occur at a facility not accessible by the community, thereby reducing the potential for contact with either contaminated groundwater and/or chemicals used in the treatment process.
	1	Groundwater extracted during free-product removal would be treated prior to surface water discharge. The treatment process would meet New York State surface water discharge standards and effectively reduce contaminant concentrations to levels considered protective of human health and the environment.

TABLE 4-2
(continued)
EVALUATION OF ALTERNATIVES

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

CRITERIA	ALTERNATIVE	ASSESSMENT
EFFECTIVENESS (continued)	2	Groundwater extracted during free-product removal would be treated prior to reinjection to the aquifer. The groundwater treatment process would reduce contaminant concentrations to meet New York State drinking water standards considered protective of human health and the environment.
	1 & 2	All waste material generated as part of this alternative will be disposed at an approved hazardous waste facility as necessary.
Protection of Workers During the Removal Action	1 & 2	Minimal exposure to contaminated media is expected with the FT-002 removal actions.
	1 & 2	Personal protective equipment would be required for any intrusive operations on-site (e.g., installation of recovery wells) to limit exposure to contaminants.
	1 & 2	Personal protective equipment would be required to handle free-product, sludge, and some treatment chemicals.

TABLE 4-2
(continued)
EVALUATION OF ALTERNATIVES

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

CRITERIA	ALTERNATIVE	ASSESSMENT
EFFECTIVENESS (continued)	1 & 2	Appropriate air monitoring devices would be used to ensure exposure to contaminants volatilized during the removal is within acceptable limits. OSHA standards and other applicable guidelines would be consulted to establish appropriate exposure limits.
Environmental Impacts	1 & 2	On-site removal activities would have minimal impact since FT-002 was originally cleared in the 1950s and used as a fire fighting training area for over 30 years.
	1 & 2	Recovered free product would be stored in an aboveground container and disposed at an approved hazardous waste facility. There is low probability that the free product would be released to the environment. Appropriate remedial actions would be taken to limit the impact of any releases during this process.
	1 & 2	Removal of free product from the aquifer would provide long-term benefits to the environment.
	1	Treated groundwater discharged to the tributary to the Salmon River would meet surface water discharge limits established by NYSDEC for the protection of the environment.

TABLE 4-2
(continued)
EVALUATION OF ALTERNATIVES

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

CRITERIA	ALTERNATIVE	ASSESSMENT
EFFECTIVENESS (continued)	2	Treated groundwater discharged to the aquifer at FT-002 would meet Class GA groundwater standards established by NYSDEC for protection of the environment.
Time Until Protection is Achieved	1 & 2	The time required to complete the removal action is unknown because of uncertainty associated with estimating the recoverable free product in the soils and the highly variable nature of free-product recovery rates. However, it has been assumed that a minimum of 12 months and a maximum of 15 years would be required to conduct the removal action.
Threat Reduction	1 & 2	Contaminated groundwater, extracted during the removal, would be treated.
	1 & 2	Recovered product would be treated or disposed off-site.
	1 & 2	High concentrations of contaminants would remain in the soil and only a small portion of the dissolved plume would be treated. Residual product and the dissolved plume would have to be addressed by future remedial actions.
	1 & 2	Sludge from the metals pretreatment system would contain high concentrations of metals and require off-site disposal. However, the principal metals anticipated in the sludge are of relatively low toxicity.

TABLE 4-2
(continued)
EVALUATION OF ALTERNATIVES

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

CRITERIA	ALTERNATIVE	ASSESSMENT
EFFECTIVENESS (continued)	1 & 2	Spent carbon would contain high concentrations of organics and require off-site disposal or regeneration.
	1 & 2	Removal of free product would significantly reduce potential risks to both human health and the environment because free product is acting as a source of groundwater contamination.
	1 & 2	Groundwater beneath the site is Class GA, which is defined as a potable water source. Although the groundwater beneath the site is not currently used for potable purposes, contaminated groundwater is migrating from FT-002 and the potential exists for changes in current groundwater use.
	1 & 2	The potential exists that contaminated groundwater may discharge into surface water bodies potentially impacting the water quality of the aquatic environment.
	1 & 2	Drawdown of the aquifer below the free-product layer may result in residual product collecting in the soil below the normal water-table level. The residual product could act as a source of groundwater contamination when the water table returns to its normal level (i.e., when the drawdown system is turned off)

TABLE 4-2
(continued)
EVALUATION OF ALTERNATIVES

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

CRITERIA	ALTERNATIVE	ASSESSMENT
EFFECTIVENESS (continued)		
Potential Exposure to Remaining Risks	1 & 2	Potential exposure to contaminated groundwater would be minimal; affected groundwater is not currently being used as a drinking water supply and is within the boundaries of Plattsburgh AFB.
	1 & 2	Potential exposure to residual product would be minimal; soil containing residual product is located on-site, approximately 35 feet below ground surface.
	1 & 2	Groundwater and residual product in soil would be addressed by future remedial actions.
	1 & 2	The removal of free product would significantly reduce the source of groundwater contamination.
	1 & 2	The FT-002 removal action would not address contaminated groundwater beneath the site. The remaining groundwater contamination is expected to exceed state groundwater quality standards and thus present a potential risk to human health and the environment. However, the risks from groundwater exposure are limited because the aquifer beneath the site is not currently being used for potable purposes.

TABLE 4-2
(continued)
EVALUATION OF ALTERNATIVES

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

CRITERIA	ALTERNATIVE	ASSESSMENT
EFFECTIVENESS (continued)		
Long-Term Reliability for Providing Continued Protection	1 & 2	Although a major source of contamination would be removed, the free-product removal action would not provide long-term protection because residual contamination would remain in the soil and groundwater would still be contaminated. Future remedial actions would be required to provide long-term protection.
Compliance with ARARs	1	Treated groundwater discharged to the tributary of the Salmon River would meet surface water discharge limits established by NYSDEC.
	2	Treated groundwater reinjected to the aquifer at FT-002 would meet drinking water standards established by New York State.
	1 & 2	The air stripping tower is expected to comply with Plattsburgh AFB height limitations for structures built near the runway. Based on the anticipated height of the air stripping tower (30 feet) it would have to be located at least 1200 feet from the centerline of the runway.

- Air discharge limitations
- treatment plant for ground water must meet applicable state standards

TABLE 4-2
(continued)
EVALUATION OF ALTERNATIVES

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

CRITERIA	ALTERNATIVE	ASSESSMENT
EFFECTIVENESS (continued)	1 & 2	It is anticipated that regulations relating to general facility standards and operations, excavation activities, storage and treatment of hazardous waste, and general employee operations would be met.
IMPLEMENTABILITY		
Technical Feasibility	1 & 2	The recovery system described in Subsection 3.1.1 has been widely used for the recovery of free-product and demonstrated to be reliable and effective.
	1 & 2	Metals pretreatment, air stripping, and carbon adsorption are feasible technologies for the treatment of organic and inorganic compounds such as those found in the groundwater at FT-002.
	1 & 2	The technologies associated with the treatment system have been widely used for site remediation and industrial processes.
	1 & 2	Alternatives are consistent with future remedial actions; a major source of the existing groundwater contamination would be removed. The extraction and/or reinjection wells may be used, once free-product recovery has stopped, as part of a vapor extraction system for soil remediation or part of a groundwater "pump and treat" system.

TABLE 4-2
(continued)
EVALUATION OF ALTERNATIVES

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

CRITERIA	ALTERNATIVE	ASSESSMENT
IMPLEMENTABILITY (continued)	1 & 2	Wells at the site could hinder future remedial actions if excavation is required in the vicinity of the wells.
	1 & 2	Air stripper packing material would require replacement approximately every 5 years. The design life of all moving parts associated with the treatment system (e.g., pumps and blowers) is estimated to be 15 years. Because the treatment system would not operate for longer than 15 years, these replacement costs were not included in the cost estimates.
	1 & 2	Components of the treatment system (e.g., pumps) should not have to be replaced over the lifetime of the system (up to 15 years).
	1 & 2	The technologies used in all phases of the removal are not complex, but maintenance would be required for all the equipment.
	1 & 2	Carbon filters would have to be regenerated or replaced periodically.
	1 & 2	Air stripping tower packing would have to be replaced every 5 years to address fouling by organic and inorganic material.
	1 & 2	Sludge from metals pretreatment would require off-site disposal.

TABLE 4-2
(continued)
EVALUATION OF ALTERNATIVES

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

CRITERIA	ALTERNATIVE	ASSESSMENT
IMPLEMENTABILITY (continued)	1 & 2	Recovered product would require off-site disposal.
	1 & 2	Pilot tests would be required to establish operational parameters of the treatment system prior to full implementation of the removal action.
	1	Alternative 1 would achieve free-product removal and treated groundwater would meet surface water discharge requirements.
	1	The pipeline that would be constructed to transport water from the treatment system to the discharge point would have to be buried below frostline to prevent the water from freezing.
	2	Alternative 2 would achieve free-product removal and treated groundwater would meet groundwater reinjection standards.
Availability	1 & 2	The materials, equipment, and expertise required for the implementation of the alternatives are available from a wide range of companies that regularly implement remedial technologies.
	1 & 2	It is anticipated that up to nine months would be required to set up either removal action alternative at the site.

TABLE 4-2
(continued)
EVALUATION OF ALTERNATIVES

FT-002 FREE-PRODUCT REMOVAL ENGINEERING EVALUATION/COST ANALYSIS
PLATTSBURGH AFB

CRITERIA	ALTERNATIVE	ASSESSMENT
IMPLEMENTABILITY (continued)		
Administrative Feasibility	1 & 2	Permits would not be required for implementation of the removal action because Plattsburgh AFB is on the NPL; however permit requirement must be satisfied.
	1 & 2	State acceptance of each alternative will be evaluated during the 30-day public comment period.
COST		
	1	Capital Cost = $727,000
		Annual Operation and Maintenance Costs = $125,000
		Net Present Worth = $1,266,000 to $2,063,000
	2	Capital Cost = $726,000
		Annual Operation and Maintenance Costs = $113,000
		Net Present Worth = $1,216,000 to $1,944,000

4.3 PROPOSED FREE PRODUCT REMOVAL ACTION ALTERNATIVE

Based on the evaluation conducted in Subsection 4.2, Alternatives 1 and 2 would provide similar (1) protection of the community and workers during the removal action, (2) protection of the environment, (3) reduction of existing threats, and (4) long-term reliability for providing continued protection. Additionally, Alternatives 1 and 2 would both attain ARARs, require up to 9 months for on-site setup, and removal activities would operate for a minimum of 12 months and a maximum of 15 years after startup.

Based on the current surface water discharge standards, the net present worth of Alternative 1 is $1,266,000 for 5 years of operation and $2,063,000 for 15 years of operation. Based on the current groundwater reinjection standards, the net present worth of Alternative 2 is $1,261,000 for 5 years of operation and $1,944,000 for 15 years of operation.

Because of the similarities in the evaluation of alternatives, Alternative 1 or Alternative 2 could be selected as the preferred alternative for free product removal at FT-002. Plattsburgh AFB has selected Alternative 1 as the preferred removal action alternative (Alternative 1: Free Product Skimming with Aquifer Drawdown; Groundwater Treatment; and Discharges to Surface Water). If the surface water discharge standards are modified by NYSDEC, revised cost estimates for Alternative 1 could be further reduced.

GLOSSARY OF ACRONYMS

ACL	Alternate Concentration Limits
AFB	Air Force Base
ARARs	Applicable or Relevant and Appropriate Requirements
AWQC	Ambient Water Quality Criteria
BACT	Best Available Control Technology
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BETX	benzene, ethylbenzene, toluene, xylenes
BMP	Best Management Practices
BPJ	Best Professional Judgement
BPT	Best Practicable Control Technology Currently Available
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CWA	Clean Water Act
DCE	dichloroethene
DERA	Defense Environmental Restoration Account
DOD	Department of Defense
DOT	Department of Transportation
DRMO	Defense Reutilization and Marketing Office
EE/CA	Engineering Evaluation/Cost Analysis
HAZWRAP	Hazardous Waste Remedial Action Program
HSWA	Hazardous and Solid Waste Amendments
IRP	Installation Restoration Program
MCLs	Maximum Contaminant Levels
MCLGs	Maximum Contaminant Levels Goals
MMES	Martin Marietta Energy Systems, Inc.
NAAQS	National Ambient Air Quality Standards
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NYCRR	New York Compilation of Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OSHA	Occupational Safety and Health Administration
POL	petroleum, oil, lubricant
POTW	publicly owned treatment works
RCRA	Resources Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
SAC	Strategic Air Command
SARA	Superfund Amendment and Reauthorization Act
SDWA	Safe Drinking Water Act
SI	Site Inspection
SPDES	State Pollutant Discharge Elimination System
SVOCs	semivolatile organic compounds
TBC	to be considered

GLOSSARY OF ACRONYMS

TCE	trichloroethene
TSDF	treatment, storage, disposal
ug/kg	micrograms per kilogram
ug/L	micrograms per liter
USEPA	U.S. Environmental Protection Agency
VOCs	volatile organic compounds

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